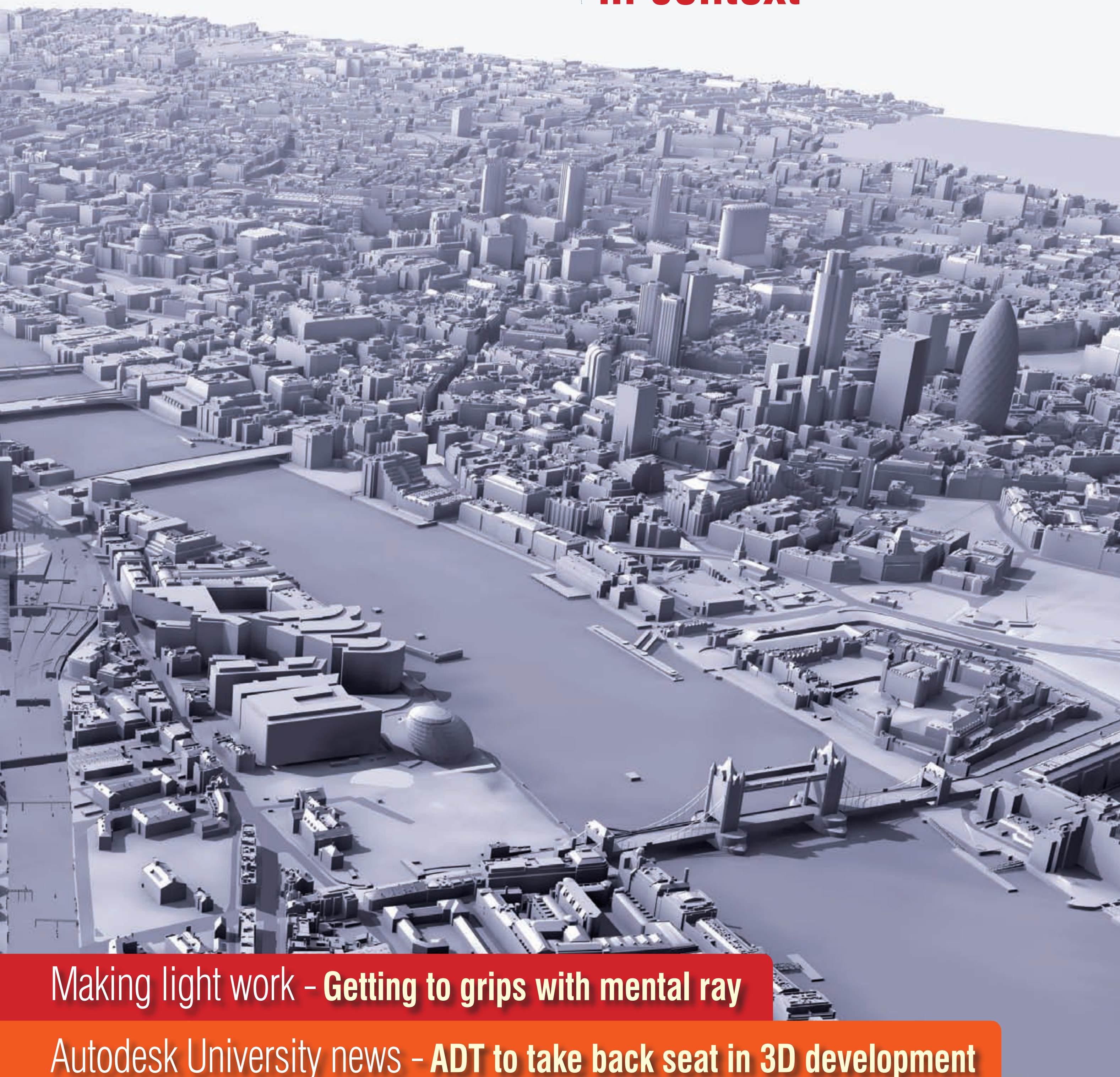
January/February 2007 >> Vol.29

AECMAGAZINE

DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT

London eye

A new era for 3D design in context



Making light work - Getting to grips with mental ray

Autodesk University news - ADT to take back seat in 3D development

www.scan.co.uk

t: 0870-755-4747

SCAN COMPUTERS

MCAD "If you're a typical SolidWorks, Inventor, or Solid Edge customer...
...machines like Scan's 3XS workstation offer an excellent proposition for the mid-range CAD sector, and more importantly for those that pay the bills, as it does this for under £1,000."

MCAD - January 2007



- Intel Core 2 Duo E6600 (2.4 GHz) (dual core)
- 2 x 1GB Corsair DDR-2 PC2-6400 800MHz memory
- ASUS P5B-E iP965 S775 motherboard
- ATI FireGL V3400 graphics card (128MB)
- 250GB Samsung SpinPoint P120 hard drive
- NEC 18x DVD±RW Dual Layer
- Microsoft Windows XP (32-bit or 64-bit) (with free Microsoft Vista upgrade)

Supplier of performance hardware and workstations

SCAN computers

Our principal business is to build and supply specialised high performance systems and sell PC components and peripherals from top manufacturers via the web and mail order. Heavy investment in our backend systems combined with a great work force has allowed us to achieve an award winning service level whilst still being competitive in a near perfectly competitive market.

CORSAIR™

Corsair has recently introduced the World's First Ultra Low Latency DDR2-800 CL3 Memory – the TWIN2X2048-6400C3. This sweet memory module kit offers ultra low latencies of 3-4-3-9. In addition to low latencies, the TWIN2X2048-6400C3 features Enhanced Performance Profiles (EPP), a new open memory standard jointly developed by Corsair and NVIDIA designed to simplify the overclock-ing process, while ensuring platform and component compatibility.



Intel® Core™ Duo processor

Featuring Intel® Digital Media Boost, the Intel® Core™ Duo processor delivers enhanced performance on floating point-intensive applications such as CAD tools, video editing, digital music, digital photography and gaming.

- Maximum everything.
- Energy-efficient performance.
- Multimedia power.

PNY TECHNOLOGIES — NVIDIA Quadro FX — The Standard for Workstation Graphics

NVIDIA Quadro FX
The Definition of Performance.

NVIDIA Quadro® professional graphics deliver unmatched workstation performance and quality. It takes the leading computer-aided design (CAD) and digital content creation (DCC) applications to a new level of interactivity by enabling unprecedented capabilities in programmability and precision.

AECMAGAZINE
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Vol.28: Contents

Nemetschek to acquire Graphisoft

In a surprise move, Hungary-based Graphisoft, the developer of ArchiCAD, has agreed to accept a two-stage buyout from Munich-based Nemetschek AG, Europe's largest AEC-based CAD/BIM vendor. Nemetschek will first acquire a majority interest in Graphisoft at €9/share, approximately its current trading price, then make a public tender offer for all remaining shares. The move unites Europe's two largest AEC-specific CAD/BIM vendors, both of whom were early adopters of 3D modelling as a primary AEC design tool. Until Autodesk purchased Revit, Graphisoft's ArchiCAD was probably the most advanced BIM solution on the market.

Graphisoft's ArchiCAD and Nemetschek Allplan and VectorWorks are all popular with 'architecture firms in Europe, and both are available on Apple Mac and Windows versions. The companies have seen good adoption in countries like Germany and Eastern Europe, keeping Autodesk from dominating in certain countries but have had limited success in North America.

Graphisoft's newer Virtual Construction line of products are starting to gain a following among some of the more progressive construction firms around the world, enabling them to model the construction of buildings over time in what they term '4D'. The move was a big risk for the company but has proven to have initiated a new market.

The move gives Nemetschek a numerical advantage of seats and market share in important European countries like Germany. The company has a history of buying CAD products and maintaining their brands. AEC expects ArchiCAD to be maintained and developed.

www.nemetschek.com* / *www.graphisoft.com

Acecad updates Strucad steel detailer

Acecad has announced StruCad V12, the latest version of its 3D structural steel detailing system. The new release features a range of enhancements designed to boost system performance, improve productivity and enhance the product's CNC/CAM functionality.

Visualisation modes in Version 12 can now be set to 'solid' for accuracy and ease of visual identification, or 'wireframe' for fast and clutter free display. A new concept that simplifies complex connections, results in enhancements in modelling speed and improved interactive connection modelling and enhanced cutting features, for an even more productive modelling environment, says its developers. Several new automation features have also been added including a new stairs set-out system, a set of new truss/joist macros and numerous other connection enhancements.

StruCad's automatic drawing system has also been improved and includes a new browser which includes unctions for DWG, DXF and DWF formats.

A new hot rolled CAM system allows custom shape configuration to fit a variety of CNC processing requirements, as well as providing support for the new scribing and contour marking technologies available from some of the larger CNC manufacturers.

Other features include enhancements to both the SPF drawing viewer and StruWalker, designed to improve collaboration between all parties involved in a construction project, and tighter integration with StruM.I.S .NET, the latest version of AceCad's fabrication management system.

www.acecad.co.uk

Buildonline and Citadon merge to form CTSpace

Two leading providers of Software as a Service (SaaS) collaboration, BuildOnline and Citadon, have agreed to merge. The merged entity will be known as CTSpace and will continue to support customers using current versions of products from both Citadon and BuildOnline.

"The synergies across our software platform and customer portfolio put the new organisation in a unique position to deliver solutions and services to clients on a global basis, which no other player in this market can do," said Howard Koenig, CEO of CTSpace. "The current market landscape consists of either small niche players with no global reach to meet client demands, or larger organisations trying to jump on the SaaS bandwagon with complex, feature heavy solutions that are difficult and costly to implement."

CTSpace's solutions allow companies to automate and streamline communications between departments, offices, companies, and countries – without purchasing hardware or software.' ***www.ctspace.com***

Advance Steel boasts improved connectivity

CADS has unveiled Advance Steel 7.1, which brings a range of new features to the AutoCAD-based steel modelling and detailing suite. Advance Steel is designed for cold rolled, structural and secondary steelwork such as staircases and especially mezzanines.

The new release takes advantage of the latest AutoCAD 2007 platform features, with traditionally difficult shapes such as spirals and helixes now supported. In addition, all of the well established integration of AutoCAD to existing IT standards, such as MS Office, are exploited. This connectivity is further enhanced with import and export functions to Revit, KISS, Fabtrol and compatibility with SDNF and CIS/2.

Version 7.1 includes improvements to the drawing functionality, so drawings generated from Advance Steel now require the minimum of editing, says it developers.

New profiles, such as Corus Advance are now included, whilst Hi-Span and Metsec CAM and accessory macros are also supported along with the existing Ayrshire. ***www.cads.co.uk***

Laser scanner released for architectural surveys



3D Laser Mapping has launched a new high accuracy, high-speed laser scanner specifically designed for the rapid acquisition of 3D images for architectural and building surveying. The Riegl LMS Z390 uses laser beams to record the position of features and surfaces and the scanner also includes an integrated Nikon D200 12.3 Megapixel camera for the capture of digital images of the scene being surveyed.

www.3dlasermapping.com

Google adds presentation graphics to sketchUp Pro



Google SketchUp Pro 6, the latest version of the concept modelling tool for architects, is now available for download and purchase. The biggest addition to SketchUp Pro 6 is LayOut, which is designed to make it easy to build professional design presentations and high-resolution documents from SketchUp models. LayOut allows users to place, arrange, title, and annotate SketchUp models, photos and other design elements to assemble presentation graphics and design documentation.

www.sketchup.com

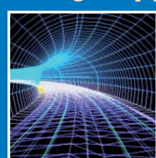
Graphtec release low cost scan/print/copy solution



Graphtec is preparing the release of the ScanPrint SP200W, an aggressively priced entry-level, large format colour scan, copy and print system. Aimed at the CAD and GIS markets it combines two standalone devices, an A0 600 dpi optical colour scanner with a high resolution A1 thermal inkjet colour printer, within one compact, space-saving footprint. The Graphtec ScanPrint will be sold by Softcover with a UK list price of a UK list price £4,650.

www.graphtecscanprint.com

Bentley unveils new rail design application



Bentley Rail track XM Edition is Bentley's new railway alignment and surface design application. According to Bentley, it delivers the best of InRail and MxRail, in a more advanced solution. Bentley Rail Track features a range of design tools, but also brings into play all the factors that influence track performance. Users may design in a civil engineering context - integrating cant or superelevation, earthworks, and more. Bentley Rail track is available for MicroStation and AutoCAD. ***www.bentley.com***

PNY and IMSI bundle CAD with graphics cards



PNY has teamed up with IMSI/Design to offer a software and hardware bundle combining specific Nvidia Quadro FX graphics by PNY and TurboCAD Professional v11 and v12. All distributors, resellers and end-users ordering the Nvidia Quadro FX350 and FX560 by PNY will receive a complimentary fully functional license of TurboCAD Professional v11, the 2D/3D design software. In addition, end-users will also have the option to upgrade from TurboCAD Professional v11 to TurboCAD Professional v12 (+Mechanical Pack or Architectural Pack) for only £149.

www.pny.com / www.imsidesign.com

Nvidia unveils new high spec mobile graphics card



Nvidia has upped the ante in the mobile workstation space with the introduction of the high-end Quadro FX 3500M graphics card which offers up to 512MB G-DDR3 memory. This new graphics solution is available as an option on the Dell Precision M90 mobile workstation.

www.nvidia.co.uk / www.dell.co.uk

Rock unveils Core 2 Duo-based mobile workstation



Rock has released its latest mobile workstation, the Xtreme CTX PRO Quadro. The Intel Core 2 Duo machine features a 17 inch X-Glass Screen (1,920 x 1,200), Nvidia Quadro 2500M graphics, 2GB RAM, and a 100GB, Serial ATA hard drive. ***www.rockdirect.com***

Autodesk tunes Maya 8.5 for optimal performance



Autodesk has announced Maya 8.5, the latest version of its 3D animation, modelling and rendering software. Available for Mac and PC, Maya 8.5 includes a number of new artist-driven features and performance optimisations. ***www.autodesk.com***

Fabsec cellular beams clarification

Following on from the review of Fabsec Fbeam in the November/December edition, AEC Magazine would like to clarify that Fabsec's cellular beams can actually span from 12 to 24 metres, which enables engineers to create large internal spaces without support columns. ***www.fabsec.com***

SOM invests in GT's Digital Project



Internationally renowned, architect firm, Skidmore, Owings & Merrill LLP (SOM) has invested in 100 seats of Digital Project, the parametric Project Lifecycle Management (PLM) software developed by Gehry Technologies (GT) and sold and supported in the UK by CenitDesktop.

Digital Project will be deployed over a three-year period in SOM offices around the world, and will complement its advanced digital design process.Gehry Technologies will also provide consulting services and support to SOM for an initial period of three years. This will include services for training, implementation, and advanced modelling.

Digital Project is an advanced BIM software developed by GT with Catia as its core engine. It is a customised version for use by all members of the building design team - including architects, structural engineers, MEP engineers, contractors and fabricators.

"Digital Project is the new high-end of BIM software that is being used or evaluated by some of the most advanced design offices in the AEC sector," noted Geoff Haines managing director of UK DP supplier, CenitDesktop. "The real promise of BIM lies in its application across the entire project team, especially in the area of improved building performance." Haines added, "It is gratifying to see SOM taking this visionary leadership position and we look forward to supporting the firm's London office by helping to derive the maximum benefit from DP."

www.gehrytechnologies.com / www.cenitdesktop.com

Nemetschek forms alliance with Adobe

Nemetschek and Adobe have formed a strategic alliance with a view to enhancing the use of PDF for data exchange within the building industry. A central component of the collaboration is the licensing of the Adobe PDF Library Software Developer Kit by Nemetschek. This will not only enable Nemetschek customers to generate PDF files with layer structures from inside Allplan but also enable PDF files to be re-imported back into Allplan..

www.nemetschek.com / www.adobe.com

Excitech turnover grows 25% to £14m

Leading CAD solution supplier, Excitech, has announced growth of over 25% in turnover from £11m to over £14m for its year ending 31st May 2006.

"I am proud of what we have all achieved over the last year. Not only has the company increased its financial strength but we have made significant investments in industry expertise to help clients realize a return on their investment in CAD and IT,"says Adrian Atkinson, Excitech's Managing Director. ***www.excitech.co.uk***

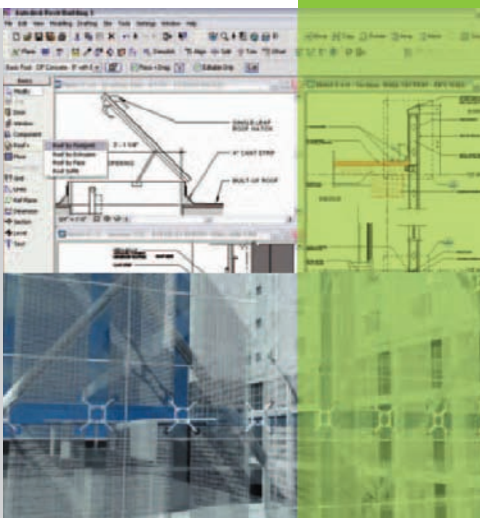
HP delivers a new era in workstation technology



HP has given a glimpse into the future of workstations with the introduction of its new Blade solution, which offers an entirely new way of thinking about workstations. Marking a shift away from traditional deskside machines, HP's unique Blade Workstation solution features multiple rack mounted workstations stored in a remote secure data centre. Users access their individual workstations over the network using a thin client. No CAD data is transferred across the network, and all the processing, including 3D graphics, is done on the blade workstation, which then simply transmits compressed and encrypted pixel information to the thin client while the user's mouse and keyboard events are fed back to the blade workstation. A good way of thinking about this is that the user is simply at the end of a very long monitor cable. The potential benefits for data security, real time collaboration, IT support and remote working are huge as the systems can also work over the Internet.

www.hp.com/workstations





Autodesk University 2007

Autodesk's yearly event for users just keeps getting bigger. This year a record 7,500 'birds of a feather' flew to Las Vegas to watch, listen and learn. Martyn Day joined the migration.

Love it or loathe it, Las Vegas is one of the few cities that can easily play host to massive conferences. Autodesk University is now a seriously large event and the increase in numbers of attendees reflects Autodesk's increased presence in the market, if that was possible. It seemed only yesterday we were asking, when will Autodesk be a billion dollar company? As I write this, Autodesk is almost a $2 billion company. In the last two years Autodesk's growth has outpaced all of its rivals and now dominates multiple vertical markets and is at the forefront of 2D to 3D migration.

Vegas is a strange place and the Venetian hotel, where AU is now hosted, is an even stranger place. Based on, umm the whole of Venice, the hotel and casino comes complete with a replica Campanile and St Mark's square, canals (on the second floor, no less) and gondolas with gondoliers! As AU is such an intense experience, with lots of Autodesk info to take in, there's little chance to explore, but the occasional visit to the second floor 'indoor' canal area for a bite to eat or coffee comes as a welcome respite. The realistic clouds and clever, constant, 'evening' lighting does make you briefly wonder if you are indeed outside, which adds to the confusion when you are offered to eat 'inside' in a restaurant by the canal or al 'fresco', all while deep within the hotel on the second floor. It has a touch of the Willy Wonka about the whole place.

This was the first Autodesk conference at which Carl Bass, the new company CEO and President, had full reign and the format and style had certainly changed. While typically Autodesk's mainstage had been a Carol Bartz sermon, followed by tantalising sneak peaks of forthcoming technology, this time around, Autodesk let its customers take centre stage. This is a risky concept as most engineers and architects don't regularly present to 7,500 people but in a series of informative and concise presentations we got the message of integration. Thinking beyond using one point solution to get a drawing out, and looking at way to think smarter and look for innovative approaches to design problems.

"Jay Bahtt, of Autodesk told me that it was common knowledge that ADT would not be developed aggressively in 3D anymore and that the concentration of development would be on ease of use."

Presentations came from all corners of the design world, AEC, MCAD, Military, Civil and Mapping. We even got to wear 3D glasses! Whilst the majority were pure customer presentations, Autodesk employees were on hand to drive some demonstrations and if you looked hard enough you could see some new technology being shown. The most obvious of these was Project Freewheel, which is a web client DWF viewer, which Autodesk has available on its Autodesk Labs website. This was demonstrated several times, even within the virtual 'Second Life' 3D environment, where one architect uses the online 'game' to walk clients through designs for their houses. Second Life is a place where people can go and interact with other 'avatars' and have another parallel life (as if one isn't enough!).

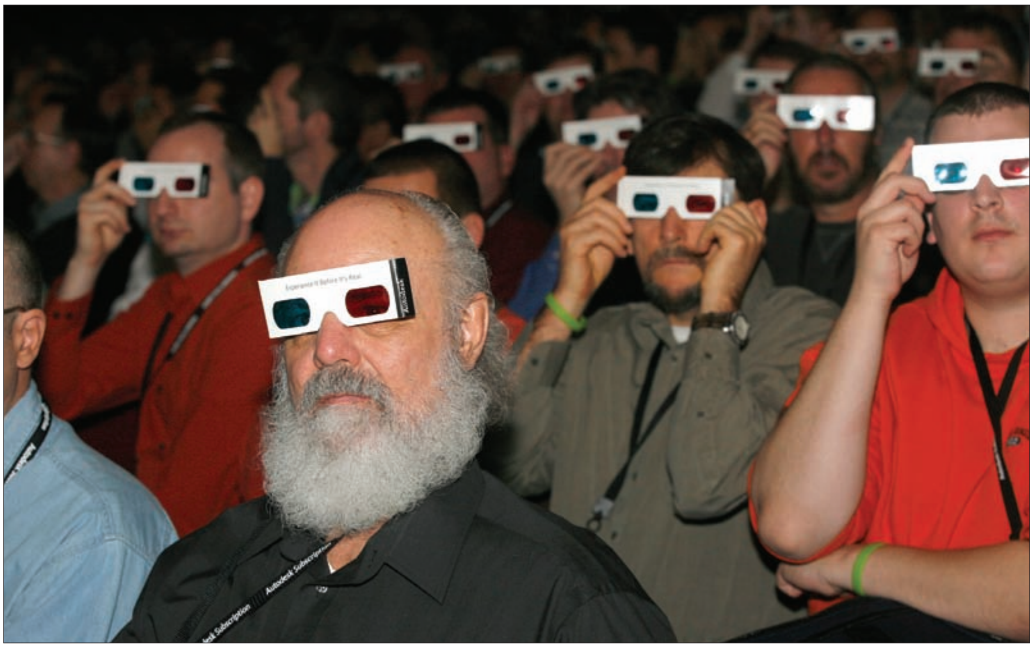


Following his first Autodesk University keynote as Autodesk CEO, Carl Bass left the stage to let his customers do the talking.

AutoCAD 2008

There was also a sneak peak of AutoCAD 2008, for those of you who are interested. I have to say that the core functionality looks to be a fulfilment of Autodesk User Group International (AUGI) wish lists which tend to be 'bitty' in nature and generally hard to get excited about. Having said that the one feature that looks to be of interest but wasn't demonstrated was a parametric engine for AutoCAD. Autodesk Revit and Autodesk Inventor both have parametric engines and I understand that AutoCAD's will be a different one, so integration will be an interesting problem to solve. It will also be fascinating to see if these parametrics are just for 2D or if they can apply to all the 3D functions that were added in 2007. For those who don't have a clue what parametrics are, it's essentially an ability to link geometry together using rules. This makes editing fast and you can explore the design interactively by working with what's called constrained geomertry. All that was shown were the dialogue boxes which will come with the next release, no demo and just a brief verbal explanation. Autodesk was obviously trying to keep the biggest addition to AutoCAD under wraps. As usual it looks like the release of all of Autodesk's products will be in March.

I really do hope AutoCAD 2008 has a bit more in it than was demonstrated as this year kicks off with some bad news for Autodesk customers, as there are some pricing and policy changes coming into effect. The first effect will be hard to gauge but I believe that the street price of AutoCAD will go up between 5 and 10%, this is the net effect of changes to how much dealers have to pay for buying AutoCAD from Autodesk. This margin change will push up the street price. This has been slightly compensated with rewards for selling vertical products – in AEC that's ADT and Revit, so in the new structure ADT and Revit will appear better value than before. The next bad piece of news is that multi-copy discount ends in February. For many, many years, Autodesk has offered bulk purchasers discounted copies of AutoCAD, there were bundle prices for five and ten seats and then really big customers had a scale to work off. All that ends in February, with the official line being that it's to get the same policy in all countries. I have talked to several Autodeskers who say that doesn't mean that they won't discount on multiple seats but there's no automatic discount. This means that Autodesk will pander to the larger firms but mid-size companies will probably be out of luck. This news is quickly



followed up with a reminder that Autodesk is about to 'retire' AutoCAD 2004, meaning users of 2004 should upgrade or go on subscription if they are not to pay full price for a future release. By moving to a yearly release cycle and still retiring the third release back, Autodesk has compounded the obit time from four-five years for a release to three. Added to all this I hear that there will be incremental increases when the new releases come out in March.

AutoCAD isn't cheap for 2D drawing and these moves are not going to change Autodesk customer's negative perceptions about the company's business practices. With the increased rate of development, I have seen little to say that users have deployed these new releases any quicker than before, leading to a lot of AutoCAD shelf-ware. While I have been pretty happy with the functionality that's been added to AutoCAD in the last three releases, Autodesk should be concerned that end-users are not taking advantage of the updates and there is a growing disparity between the value added by Autodesk and the value perceived by customers. In response to this critique Autodesk might just point to the amazing growth in sales the company has been enjoying, as some kind of indication of the happiness of its customers. However this argument makes no sense when you look at Microsoft's dominance and the negative perception of it by customers. Microsoft was so shocked at the lack of support from its customer base when the FCC decided to investigate splitting up the company due to its business practices that it initiated a multi-million dollar program to try and get in-touch with its customers.

AEC products

For Autodesk, the Architectural market is a two horse race, Architectural Desktop and Revit. One is AutoCAD-based, the other is a brand new code stream. When Autodesk first bought Revit, it had spent a lot of development effort on ADT to try and make it competitive in 3D; the net result was Autodesk's internal teams competing with one another. ADT by far had the largest install base, and still does but Revit development has been extraordinary. At first the excitement of Revit had Autodesk all but hammering the nails in the coffin of ADT but user adoption of ADT continued to grow and Revit was struggling to gain traction. Autodesk readdressed its development and went on record to say it was spending equal amounts on each product's development and gave a commitment to keep producing ADT for as long as it was required.

Over the last few years the balance of marketing has certainly been tipping towards Revit again. Last year's release of ADT was very disappointing, with only the new staircase routine standing out. Talking with one of the early beta testers of ADT 2008, it seems that the forthcoming release 'has even less in it'. At AU I was looking forward to finding out what pitch would be between the two products and I have to say I was quite shocked.

Autodesk is currently living and breathing the 'moving to 3D message'. All divisions have a 3D pitch and AU was the opportunity for the AEC team to give theirs – not an easy task. For Autodesk this has boiled the product offerings down to an AutoCAD workflow, inherently 2D and is the domain of Architectural Desktop and a 3D workflow which is Building Information Modelling and therefore Revit. This pitch rewrites history a tad as ADT has a lot of 3D built-in and quite a few customers have invested in adopting ADT as a standard and have struggled and succeeded in using ADT as a modelling tool. Added to this, a product such as Autodesk Building Systems (ABS) is sold on its ability to model HVAC in 3D, inside ADT. I discussed this change in approach with Jay Bahtt, VP of Autodesk's Building Solution's Division. Bhatt told me that it was common knowledge that ADT would not be developed aggressively in 3D anymore and that the concentration of development would be on ease of use. He also assured me that ADT would not disappear on his watch at the company but nevertheless I suggested the new demarcation lines to be quite offensive to customers who had adopted ADT as their modelling solution. The future is 3D we are told and Revit once again is being prompted as the future and ADT is the architectural flavour for AutoCAD users.

This poses serious questions for architects that have decided to opt for the ADT route. If more 3D functionality is required over what they have today, they will obviously need to look elsewhere and Autodesk hopes that it will be Revit that they move to. If architects are using ADT as a 2D tool and were planning on investing in learning its 3D elements, would that now be a wise investment? Bhatt gave me a global view that the move to Revit was well underway and that BIM was also turning from a marketing phenomenon into reality. So, the future, once again, is Revit.



Attendees were given glasses for 3D presentations, with Carl Bass, Autodesk CEO, sporting his own bespoke pair.

Conclusion

Autodesk is in a different mode. It's developing new code streams, aggressively targeting competitive products and markets and acquiring plenty of new technology. It has to be said that most of this is in non-AEC areas, the task for Autodesk's Building Division' is still to get uses off vanilla AutoCAD and into a vertical, ADT or Revit. There is surprisingly little competition for Autodesk in the architecture market, although in the civil area, Bentley offers stiff competition. Autodesk's view that Revit is 3D will be unpopular with the 3D proficient ADT customers but it is true that these are the minority of ADT users. The bottom line I took away was, if you haven't already, start to evaluate Revit, unless there's a radical change in direction, Autodesk is betting the farm on it being the solution of choice for the market.

www.autodesk.com

Help us recreate the world...

Please email your CV to
Sanja Veselinovic
Sv@gmj.net

All applications will be treated in strict confidence.

It was in Las Vegas last year that we realised we might really be on to something...

We were there presenting CityModel – our inch-perfect 3D model of Central London – to an audience of 7500 delegates at the AutoCAD University. As we finished, we were pleased but surprised to be given an actual standing ovation, accompanied by much whooping and hollering.

Now, being Europe based, we're not ones to blow our own trumpets but what we are doing at the moment, really is rather good – ground breaking in fact, but we're growing fast and we need some help.

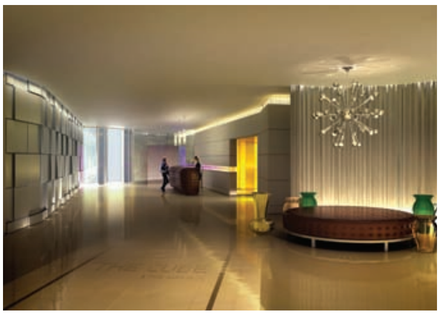
So…if you're a talented 3d visualiser we'd love to hear from you. It doesn't matter if you're at the beginning of your career or already running a team, you're good at what you do and committed to seeing how far you can go in the world of architectural visualisation.

You'll be working alongside top architects on international competition entries and high profile projects like Candy & Candy's One Hyde Park, Grosvenor's Liverpool One, Argent's Kings Cross and BDC's The Cube.

We're not talking just still images here but large scale, super-high resolution event projections and immersive environments.

Candidates should be professional, well organised, CAD literate with a working knowledge of 3D Studio Max and Photoshop. If you're a Motion Animator, Coder or Maxscript Specialist we'd also love to hear from you.

In return for your commitment, we offer a genuinely exciting career at one of Europe's longest established and best known visualisation companies, with a reputation second to none. We enjoy a friendly, supportive working environment with regular company excursions to assess architectural innovations abroad.

















GMJ



London eye

Skyscrapers are set to transform the London skyline, but some fear they will destroy the capital's heritage. GMJ Design has developed a huge digital 3D model of the city to help ensure that key landmarks are never obscured from view. Greg Corke reports.

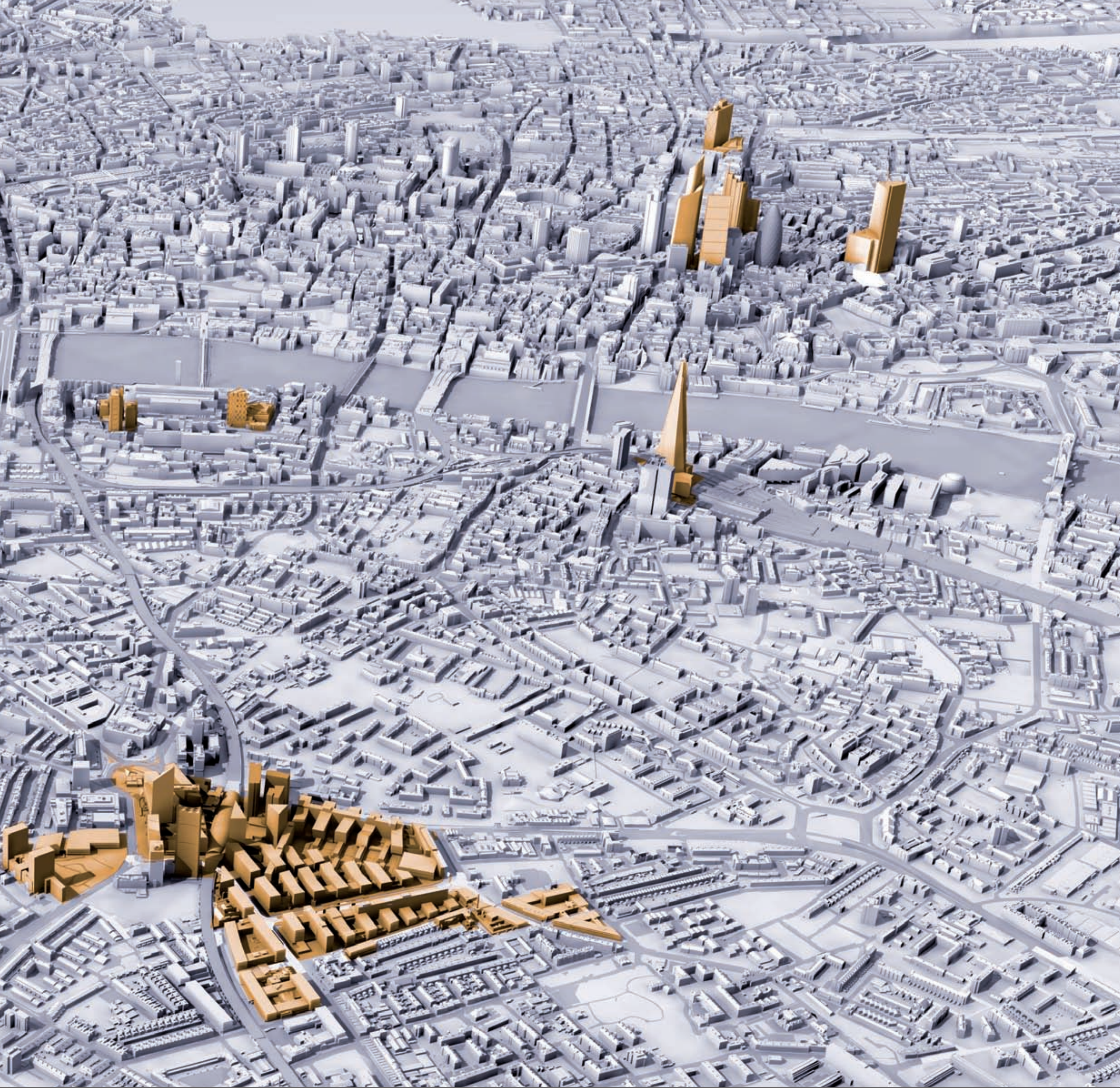
When Sir Christopher Wren was finally granted planning permission to build St Paul's in 1675, few would have thought that his cathedral would go on to dictate the size, form and location of London architecture in years to come. Protecting lines of sight to Wren's masterpiece is now one of the primary considerations when granting planning permission for new buildings in the City of London. And while skyscrapers are particularly sensitive to this policy of preserving the Capital's heritage, smaller buildings also have a responsibility to key London landmarks.

Of course, the complex process required to gain planning permission goes way beyond protecting views of St Paul's or Westminster Palace from select vantage points. Architects have to demonstrate to planners that their building will have a favourable impact upon its immediate location and within each planning application there are a series of local views that need to be produced. This has typically been a costly, lengthy process, so any technology that can help give feedback within a matter of hours is sure to make architects and developers sit up and take notice.

The GMJ CityModel

GMJ Design, a London- and Paris-based visualisation firm, has developed a 1:500 scale digital model of central London designed specifically to streamline the planning process. Architects are able to drop their models into the London GMJ CityModel and GMJ Design will give them instant feedback on how their design will impact the Capital's skyline.

The origins of the London GMJ CityModel, can be traced back to 1990 when GMJ Design started out creating design visualisations for architectural



competitions, PR, and marketing. However, over time an increasingly important part of the firm's repertoire became planning work.

In the early days the company developed a technique called verified views, where a series of photographs would be taken of the proposed site, a survey commissioned and the results combined with the 3D building design inside a digital model. A number of still images derived from that data were then used as the basis for a formal planning application.

It was out of this type of work that GMJ felt there had to be a smarter and quicker way of doing things. "We thought that if we could build a single model of London that was holistically accurate and covered all the areas that we needed then we could provide for clients a base upon which they could immediately place their proposals," explains Didier Madoc-Jones marketing director, GMJ Design. "For the very early stages of a project architects and their clients want to experiment with different shapes and forms; they want to push the boundaries; they want to see what they can do. Our model can enable them to do that. They can give us their scheme and we can put it on the model. Within hours we can give back to them hundreds of views that demonstrate the impact that their building will have on its surroundings."

The modelling process

It took GMJ Design nine months to generate the thirty-six square kilometre model of Central London, using a combination of aerial photography and ground control survey points. The company prides itself on the quality of its model, which for planning purposes needs to be accurate across a very wide area. Line of sight studies, from Hampstead Heath to The City for example, need to be exact. On a smaller scale, the modelling technique used by GMJ Design means that heights are accurate to within 100mm and everything is modelled down to the finest detail.

How London might look in 2010. From front to back. Elephant and Castle Masterplan, Make; London Bridge Tower (Shard of Glass), Renzo Piano; Leadenhall Scheme, Richard Rogers; Difa Tower (helter skelter), KPF; Heron Tower, KPF; Minerva Tower, Grimshaw; Bishopsgate Tower, SOM.

"We used 10cm aerial photography, which was stereo offset so we could get our height information by the parallax shift between the two photographs," explains Robert Graves, Creative Director. "Each 100m squared tile was rectified and stitched together and fixed to a survey with around nine ground control points. With that we get 300mm accuracy across the whole area, with heights accurate within 100mm.

"It's a good process and can generate the topography of the landscape, down to even the camber of bridges and everything above 100mm can be modelled - chimneys, dormer windows, parapets, everything you can see.



"While some of the process can be handled automatically, it is largely a manual process because user interaction is required in order to decide what is a building eaves line, what is a pavement, what is a tree, and so on," adds Graves.

The process involved to get the data into 3ds Max, the design visualisation application favoured by GMJ Design, was refined many times over the course of the project. The model was originally generated in specialist GIS software to create a polygonal shape file (SHP). The data then went through a set of translations, first to get into MicroStation DGN format, then into 3DS, at which point GMJ Design put photographic textures on for the roofs and the walls. When the model was brought into 3ds Max there were quite a few anomalies in the data set and time was spent correcting these and then texture baking two photographic maps - one for the walls and one for the roofs.

"The wall textures aren't brilliant," explains Graves, "as they were only obtained from aerial photographs, but they first act as place holders for us, and over time we can replace them with better photography."

However, for line of sight studies textures aren't required, and for aerial view studies they can often make things less clear. For aerial or massing model GMJ Design mostly uses textures to try and sort out what a client would see if they went out on site.

"Our clients will walk around the digital model and choose view points for their actual design visualisations, which would be put in context using a street-based laser scanner and hi-res digital photographs, which is another service offered by us," adds Graves.

Keeping the model up-to-date is of paramount importance and GMJ Design has developed a rapid detection process which automatically highlights any changes in the aerial photography. "From this data we are able to focus on remodelling specific sites," explains Madoc-Jones. "These changes can range from a new mansard window on a roof, trees being removed, or buildings being demolished or appearing out of the ground.

"Thanks to this process we are able to rapidly update areas of our model as necessary. We have already updated around 7.5 sq km which includes the City of London plus immediate surroundings."

The importance of 64-bit

The London GMJ CityModel contains 12 million polygons and is a one-gigabyte 3ds Max file. Due to the enormous amount of data, the model previously had to be broken down into chunks so it could be loaded up on individual workstations. Throughout the whole modelling process, GMJ was very aware of the memory limitations of 32-bit Windows.

"When we started out on the London model we set our original specification to be much looser. We were only going to model a metre and above, but we found it was a slower modelling process because you were asking people as they modelled to take measurements and make decisions as to what was in and what wasn't. We found it was more efficient just to plough through everything," explains Graves. "We knew it was never going to be loaded up into one 32-bit 3ds max file, but knew at some point things were going to change and go 64-bit. And also if we were going to go to the effort of doing this we might as well create data that is perfect even if it was slightly beyond our capabilities at the time."

Now, with the 64-bit version coming in 3ds Max 9, the project can be viewed in one 3ds Max scene. However, GMJ Design has not yet fully moved to a 64-bit environment. Most of its workstations are still 32-bit, largely because the model only needs to be loaded up in its entirety on the company's 64-bit render farm when it needs to be rendered in full. In this instance, however, GMJ Design has had to compromise on quality as mental ray, the company's rendering engine of choice, is not yet available in a 64-bit version.

Heights within GMJ's London CityModel are accurate to within 100mm.



GMJ CityModel close up from East: everything above 100mm can be modelled including chimneys, dormer windows,& parapets

"The full model views have been done using scanline rendering, but with a quite a few omni lights and simulated global illumination, but when mental ray is ready for 64-bit we will use that. We used to use Vray but it doesn't deal with accuracy as well over huge distances," explains Graves.

The future

GMJ Design's model building is not restricted to London and the company has already completed projects in other British cities. Plans are also in place to expand globally.

"Having built the London model we have developed a process and procedure that enables us to model areas of urban environment, very rapidly, effectively and accurately," says Madoc-Jones. "We've built Liverpool, we're building Newport for clients at the moment and we're looking at other cities around the world to build for other clients, and also extending the London model to include other areas.

"With the process we've evolved now we're aiming at delivering models over one square kilometre in under a week. We've developed a team and a management process that enables us to do that.

"The main thing we have to do is acquire the photography. If there isn't recent photography then we have to fly it ourselves, and then that's weather dependent, but if factors are within our control then we can move very quickly," adds Madoc-Jones.

While the model currently gives GMJ Design a competitive edge when promoting proposed developments throughout the planning stages, it has already started investigating the possibility of expanding its reach by licensing it to third parties.

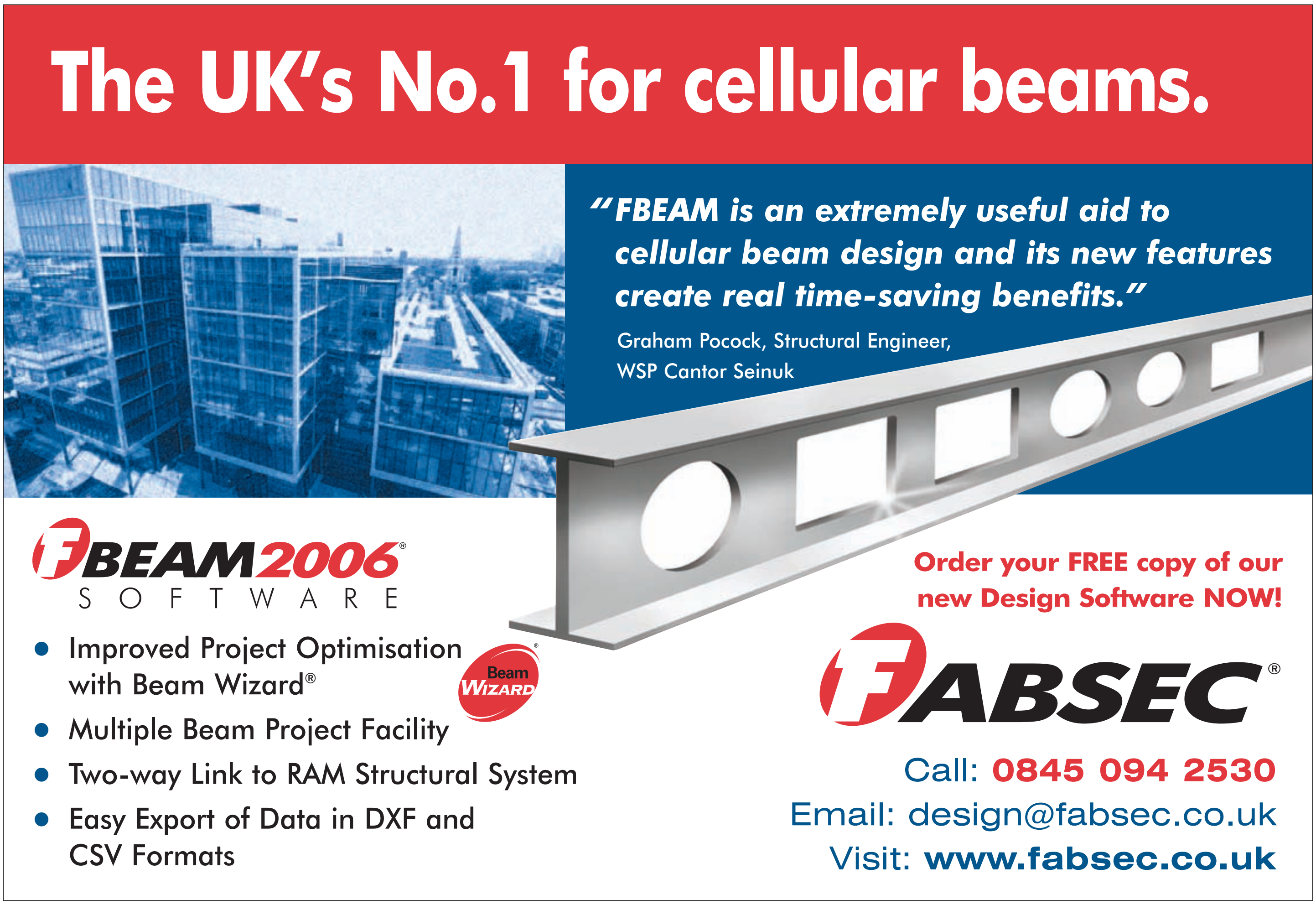
"We built the model originally with a view to aiding the planning process and using it within our core business as part of a service we offer clients for planning and visualisation studies, but we've now set up a new business called GMJ CityModel and we're looking at ways of directly licensing the model to certain commercial and government groups," explains Madoc Jones.

"Through GMJ CityModel we are looking to enable clients to license large sections of the data that they can actually use. The value we have created is based on its holistic accuracy across a very wide area and we've spent an awful lot of time and money ensuring the quality."

Indeed, this promise of accuracy in a model covering the whole of central London is certain to appeal to professionals in many other industries, beyond architects looking for instant feedback on their designs in context. From noise and flood analysis, to the film industry where it could be used to locate camera positions, the model has the potential to benefit many sectors.

The challenge for GMJ Design, as it is for any owner of geographic data, is to keep the model up to date. And with the Capital's skyline constantly evolving this will be a critical factor for the continued success of this ambitious and impressive project.

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Making light work: part II

Following on from his look at radiosity in the November/December issue, Darren Brooker introduces the second instalment of his four-part comparison of the interior lighting methods available within 3ds Max, taking us through Global Illumination with mental ray.

In the last issue of AEC Magazine we kicked off our look at the various interior lighting tools available within 3ds max by looking at radiosity, which is a Global Illumination (GI) algorithm. Of the other GI algorithms, photon mapping is the technique used by 3ds Max's alternative renderer, mental ray, which is where we'll pick up this month.

Mental ray is a production-proven renderer whose implementation within 3ds Max has in the past suffered from a lack of documentation and licensing restrictions. For these reasons, lots of Max users have given it a wide berth, but for complex lighting effects it's tremendously powerful. Not only can it do everything that's possible with the radiosity renderer, it can also go a stage further by addressing GI techniques such as caustics that the scanline cannot address without employing creative fakes. Furthermore, it is the only way within 3ds Max to generate ambient occlusion information.

In the same way that we looked at the workflow for radiosity rendering last month, we'll first take a look at how GI calculations are processed by 3ds Max when using mental ray, which is a pretty straightforward process. The first thing that we need to do is to allocate mental ray as the renderer, which is done from the Render Scene dialog, accessed by hitting F10. Now, at the bottom of the Common tab is the Assign Renderer rollout, where you should choose mental ray as the Production renderer.

Once you've done this, the tabs within this dialog will change to reflect the new renderer. Open the 02mentalRay.max file and go to the Indirect Illumination tab. You can see that there are only two rollouts within the tab, and apart from the sampling settings within the Renderer tab that can be thought of as the equivalent of the scanline's antialiasing settings, this is all you need to setup Global Illumination rendering with mental ray. First of all,

"Mental ray is a production-proven renderer whose implementation within 3ds Max has in the past suffered from a lack of documentation and licensing restrictions, but for complex lighting effects it's tremendously powerful."



enable GI in the Caustics and Global Illumination rollout. Leaving everything at its default setting, hit Render and you should be able to see from your results, that you have a GI rendering, albeit a very rough and ready one.

Like the example in the last issue, you'll need to use the Exposure Control to compensate for the dynamic range of radiosity rendering. Hit the Setup button further down the same rollout and choose Logarithmic Exposure Control. If you render now, you'll see that the exposure looks correct, but that there are noise and sampling issues, as you can see in **Figure 1.** This is dealt with within the Final Gather rollout.

Click the checkbox to enable Final Gather and hit Render again. This time you'll see that the render takes a lot longer, which is because the regather stage is a comparatively render-intensive affair. However, the Final Gather map can be stored, which saves on processing it each time a render is completed. To do this, check the Read/Write File box within the Final Gather Map section of the Final Gather rollout. Once you are happy with your results, you then merely need to place a check in the Read Only box, and this Final Gather map will be used and not overwritten, which will speed your render up by an order of magnitude.

Once your rendering is complete, you should see something similar to **Figure 2.** You should also agree that it's pretty straightforward to get up and running with GI under mental ray. However, there are some subtle but important differences between this scene file and the one you used last month.

You'll see that this file is almost identical to the one we used last month to examine radiosity. There are a few subtle differences between these scenes; the first one is that the light in this scene is a Daylight system, which enables us to allocate a mental ray sun and skylight within one assembly. The light within last month's scene file was an IES Sun light, which works with the scanline, but needed to be changed to best work with mental ray.

The second difference lies within the scene's materials, which are all mental ray Architecture & Design shaders. This is noteworthy because there are some major differences in the way that raytraced reflections and refractions are calculated internally between the scanline and mental ray. Though mental ray works with the standard max raytrace map type, it actually uses it as a placeholder for its own techniques, so it's a better idea to work with these directly.

Your rendering is of a decent quality, but is by no means a final quality solution, as we have used the

Downloading the tutorial files

Visit **www.stinkypops.co.uk/aecPt02.html** to download a zipped archive of all the scene files and textures that you will need to complete this tutorial. Unzip them to your chosen location on your hard drive.

Global Illumination with mental ray

Positives:

1. Final Gather map only needs calculating once for multiple cameras.
2. Provides floating-point output, giving increased latitude.
3. Can provide beautifully realistic results that even cover caustics.
4. Can quickly render ambient occlusion passes.

Negatives:

1. Its options can seem daunting to a newcomer.
2. Final Gather solution needs recalculating if objects moving in scene.
3. Relatively low to calculate.

Tips & Tricks

- Always check your system units.
- Work with white materials initially to define your render settings.
- Introduce curved objects to help define your render settings.
- Use photometric lights to represent real-world fixtures.
- Use the Exposure Control to account for high dynamic ranges.
- Turn on Reflectance & Transmittance Information in Preferences.
- Design your materials carefully, in line with real-world materials.
- Save out Final Gather/Photon maps to reuse.
- Work with HDR or OpenEXR formats if you want to save HDR images.



Figure 1. *Exposure Control compensates for the dynamic range of radiosity rendering, but while the exposure looks correct, there are noise and sampling issues.*



Figure 2. *Noise and sampling issues are dealt with within the Final Gather rollout.*

Generating ambient occlusion information with mental ray

Ambient occlusion displays how much ambient light the various surfaces of a scene receive due to occlusion by their own forms. This produces areas of detail around contact points and corners, which can be rendered as a separate pass and used to add extra detail and realism to a composited image.

Generating this pass is easy, thanks to the Material Override feature. Open 02mentalRayAO.max and you should find this feature on the Processing tab of the Render Scene dialog, within the Translator Options rollout. Check the box marked Enable and drag the material called ambientOcclusionMRarch from the Material Editor to the adjacent swatch.

If you were continuing with the previous scene file, and you'd previously specified a Final Gather map for reuse, you'd have to either create another or uncheck the Read/Write File checkbox to ensure that you weren't reusing your previous Final Gather map, as this will change because of the new material being applied.

Now, if you hit the Render button you should get something similar to the figure below.

This pass is best used within a compositing application, where it should be composited on top of your beauty pass to give an extra level of detail and realism.



default settings across the board so far and haven't even touched the sampling settings. To help you understand how you should take these settings further you should open the 02mentalRayExample.max file, which is all set up to render at final render quality, just like our main image. Something you should take a close look at is the materials for this scene, which are all mental ray Arch & Design shaders, so differ from regular materials.

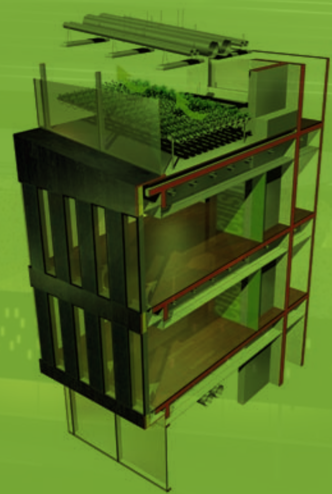
Things to note are that, like last issue, the interior lighting uses photometric lights, which use a pre-defined photometric web which many lighting manufacturers provide for their products. Just like radiosity, mental ray works with physical lighting, so making sure your units are correctly defined is important as the lighting simulations obey its physical laws. You can imagine that a three-metre high space will look quite different to a three kilometre high space when lit by the same light fittings.

Most of these tips were touched on last month when we covered radiosity, but they're pretty fundamental when working with physical lighting so they're worth reinforcing. Next month we'll continue with three-point lighting.

Darren Brooker is a BAFTA award-winning lighting artist who has worked at many top UK studios. He works for Autodesk as a product specialist. His book, Essential CG Lighting Techniques with 3ds max, is published by Focal Press ***www.focalpress.com***



Image by: atelier SoA



Bringing design to life

The ability to visualise 3D data is becoming increasingly important for not only architects, but engineers and planners as well. From highway design to noise impact assessment James Cutler, CEO, emapsite, looks at the many ways 3D visualisation can benefit AEC professionals.

One of the biggest challenges for architects, designers and landscapers, or for consulting engineers seeking infrastructure design in harmony with environmental and social expectations, is the difficulty in getting their conceptual ideas across to clients and potential end users. Overcoming this barrier with stunning presentations can make all the difference to the success of a proposal or project, be it landscape, equipment, infrastructure, building services or housing development.

In this article we consider some of the issues affecting the way in which CAD (and GIS) users create our future, the buildings, infrastructure and landscape of our everyday lives and how tools have evolved in very recent times to empower all stakeholders, from architects and technicians to citizens, project managers, government and service providers.

What is 3D visualisation?

We have touched on some of these subjects and technologies in previous articles and here endeavour to focus in on the area of 3D graphics:

- Visualisation (texture mapping[1], ray tracing[2], lighting and photo editing)
- Animation/simulation[3] (fly-by, walk-through[4])
- Modelling (solid modelling, surface modelling, wireframe modelling)[5]

The process of creating 3D computer graphics can be divided into three basic phases:

- Content creation (3D modelling, texturing, animation)
- Scene layout setup (lighting especially but also the creation of the surface or mesh)
- Rendering

For most users in our industry the pertinent areas are content (acquisition, accuracy/utility, currency, cost) and rendering though all other elements play a part.

Where were we?

Visualisation was for the movies, for wireframe drawings and those lucky enough to have great workstations and graphics cards. And for the AEC professional the choices for context and processing weren't all that extensive or accurate – users had to rely on site surveys or coarse grids and very simple rendering that was painfully slow, often took place in a separate window in the application and were disconnected from the source. Thankfully, developments in data capture and processing and convergence of technologies mean that many, including consumers, are familiar with, indeed anticipate, dynamic photo-realistic quasi-real world environments when presented with "the future".



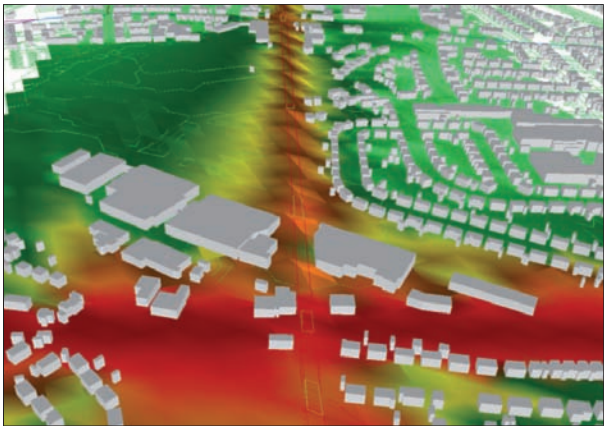


Figure 1: Noise maps on 3D building facades. 3D building height data was appended to the OS MasterMap building features (TOIDS) where available and average heights ascribed to others so that all buildings could be extruded for noise façade assessment.

What has changed? Virtual globes!

Nothing has changed – CAD users have been able to do (some of) this for years. True. However, the GAYM[6] virtual globes changed everything at least as far as the non-specialist was concerned, accelerating expectations across the professional workplace.

Virtual globes are Internet-based 3D software engines that display a partial or complete digital representation of Earth based on a set of geometric parameters. Terrain data such as elevation is then added to this representation as a base layer, and satellite imagery, aerial photographs (or even mapping) are draped over the model to give the user the impression of a 3D virtual globe on a 2D screen.

Common functions include zoom, tilt, rotate, moving to, querying, adding notations, and overlays. Depending on the software, some virtual globes also provide interfaces through which a user can design new tools and functionalities by modifying menu-driven or open-source applications.

Currently, many have limited capabilities to directly process spatial data and are primarily used for geographic visualisation and annotation. However, a trend is already evident combining the display features of virtual globes with powerful GIS functionality.

Each virtual globe offers different interfaces to create new and modify existing overlays. For example, TerraExplorer Pro offers tools to import data, modify data, and animate actions, while Google Earth's uses Keyhole Markup Language (KML), itself built on XML. Indeed, many GIS vendors now offer connectors to or export in KML to facilitate integration with and visualisation using Google Earth and other virtual globes. This is despite the fact that many of them also offer their own (usually costly) 3D extensions which may give an insight into the future of GIS (as opposed to CAD or GI)!

However, a survey of commercially available terrain visualisation software does reveal a myriad of products[7], suggesting diverse needs and wide-ranging demand that exceed the glamour of the GAYM brigade.

What lies beneath.....

Moore's law accounts for the continuing acceleration in the computer processing power that enables the sometimes-amazing rendering we have witnessed for some years but there are enablers on the data capture and supply side that are germane to their every day adoption in these systems.

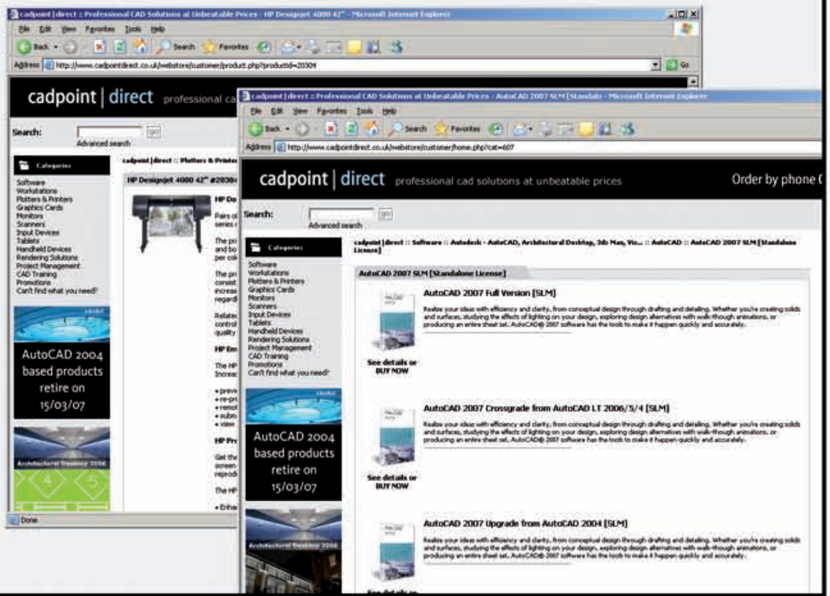
The evolution of airborne data capture techniques,

1. A technique for simulating a large amount of surface detail by mapping images (textures) onto polygons. 2.Where mathematically-modelled visualisations of programmed scenes are produced using a technique which follows rays from the eyepoint outward, rather than originating at the light sources. 3. Simulation: an attempt to model a real-life situation on a computer so that it can be studied to see how the system works - by changing variables, predictions may be made. 4. In AEC there is little dynamic animation; rather different perspectives can be obtained from viewing the model from different positions, hence the familiar fly-through. 5. In addition to these modelling processes modelling may include editing object surface or material properties (e.g., colour, luminosity, diffuse and specular shading components — more commonly called roughness and shininess, reflection characteristics, transparency or opacity, or index of refraction), adding textures, bump-maps and other features. 6. Google, Ask, Yahoo, Microsoft – or more specifically Google Earth, World Wind, Virtual Earth/Live Local, TerraExplorer. 7. www.tec.army.mil/TD/tvd/survey/survey_toc.html. 8. LIDAR (Light Detection and Ranging; or Laser Imaging Detection and Ranging) is an optical remote sensing technology which measures properties of scattered light to find range and/or other information of a distant targe. 9. Differential interferometry (D-InSAR) requires two images plus a DEM. An interferogram (called the reference interferogram) is created from the first two images. A second interferogram is created that captures topography + distortion. Subtracting the latter from the reference interferogram can reveal differential fringes, indicating vertical ground movement such as subsidence. 10. Courtesy of Mouchel Parkman; the software used was ERDAS Imagine Virtual GIS. 11. Courtesy of Hepworth Acoustics.

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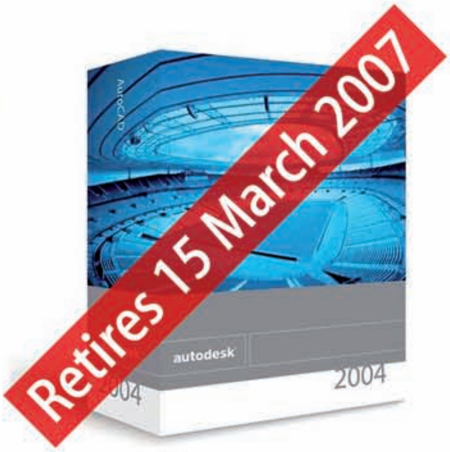
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notably LIDAR[8] and IfSAR or even differential interferometry (D-IfSAR/InSAR)[9] but also in aerial photography, that give vertical accuracy in the low 10s of cm means that high accuracy orthogonally correct three dimensional models are widely available both for urban environments and increasingly in other areas.

This in turn gives confidence to technicians and project managers alike that they can cost effectively create near real world visualisations that deliver real value to the design process and to the presentation and consultation activities along the way.

Digital Elevation Sources

Source	Vertical Accuracy
High resolution aerial photography	<5cm
D-IfSAR	5-10cm
Laser Scanning/LIDAR	<15 cm
Synthetic Aperture RADAR (airborne)	<50cm
Aerial photography	50cm-2m
EuroDEM	10-20 m
SPOT PAN	15 m
RADARSAT/ASTER	25 m
Topographic maps	10-40 m
SRTM (Shuttle)	75-90m

Real world integration

With OS MasterMap, now the de facto large scale map data source, it becomes straightforward to create real world models within an OS MasterMap environment. This is the operating context for our industry but the impact of GAYM has stimulated other areas which in turn have an impact on our industry:

- Education – this is the way future consumers already see the world
- Property - prospecting
- Planning - visualise complete proposed housing estates before they have left the planning stage from the perspective of the future occupants
- Estate Agency – sell on the same basis; 3D walkthroughs
- Defence/Security – often leading this field now using commercial applications and widely available data for mission planning, command and control, vehicle routing and training



Figure 2: 2.5d visualisation of proposed windfarm. Courtesy of ERM Limited.

- Government – local and central government are increasingly using these tools for planning activities and consultation as well as to meet e-government initiatives across a broad spectrum of requirements for citizen centric services

And what is more a new range of photographic data is becoming available that enables up to date 3D visualisation of urban environments. Technologies such as Pictometry and organisations such as the Local Data Company and Upshot provide services that augment texture mapping and ray tracing in dramatic ways.

Some recent examples

The Biggleswade bypass[10] planning process brought together terrain data, aerial photography and building height information to create the initial landscape. Into this was inserted the engineering drawing of the proposed transport corridor and profile. Advanced texturing, lighting and rendering were the prerequisites for the creation of an analytical tool and the precursors to the eventual launch of a consultative/presentational tool. In the analytical stage engineers and landscapers were able to realign the vertical profile of and plan appropriate mitigation measures for the intended bypass to reduce visual and noise impacts in first floor residential accommodation along the intended corridor. This assessment and iterative design could then play a promotional as well as consultative role!

The Trafford Interchange[11] is major freight interchange planned for South Manchester involving a new link road and 4.5km or re-opened railway requiring noise assessment across some 7,000 properties. Input data sets included OS MasterMap as the topographic base, OS Landform Profile 5m contours and OSCAR Traffic Manager for the transport network. 3D building height data was then appended to the OS MasterMap building features (TOIDS) where available and average heights ascribed to others so that all buildings could be extruded for noise façade assessment **(see Figure 1).**

Windfarm development is another area requiring significant investment in terrain data and visualisation techniques both for energy modelling and site planning but also for visual impact assessment. Viewshed analysis and intervisibility studies **(see Figure 2)** are used for site selection, planning application submission, consultation and so on. Backdrop mapping, digital terrain models and aerial photography enable the creation of near real world models that clarify the development proposition to stakeholders and allow engineers to iterate turbine position in response to wind models, accessibility, surface geology and visual impact.

Summary

3D data is now of a cost, resolution and currency that allows those needing real world environments to regard 3D visualisation as a mandatory element of their projects from inception to delivery. On top of which modern surveying techniques and third party providers enable individual property level modelling, inside and out. All of which can sit within a common reference framework provided by OS MasterMap.

3D visualisation enables designers and technicians to work to clients' briefs to conceive and visualise their projects, interrogate structural form, aesthetics and choice of texture and colours. 3D software can provide clash detection and co-ordinated design development, together with computer modelling from any angle, perspective generation of photo-realistic images, investigation of design alternatives, photo-fitting with existing photographs and animation of the computer model.

These tools enable our industry to provide significant benefits to our clients in providing a flexible platform for option assessment in the design and consultation process and in helping to deliver in such sensitive areas as obtaining difficult planning consents.

www.emapsite.com

This article was written by James Cutler, CEO at eMapSite, a platinum partner of Ordnance Survey and online mapping service to professional users

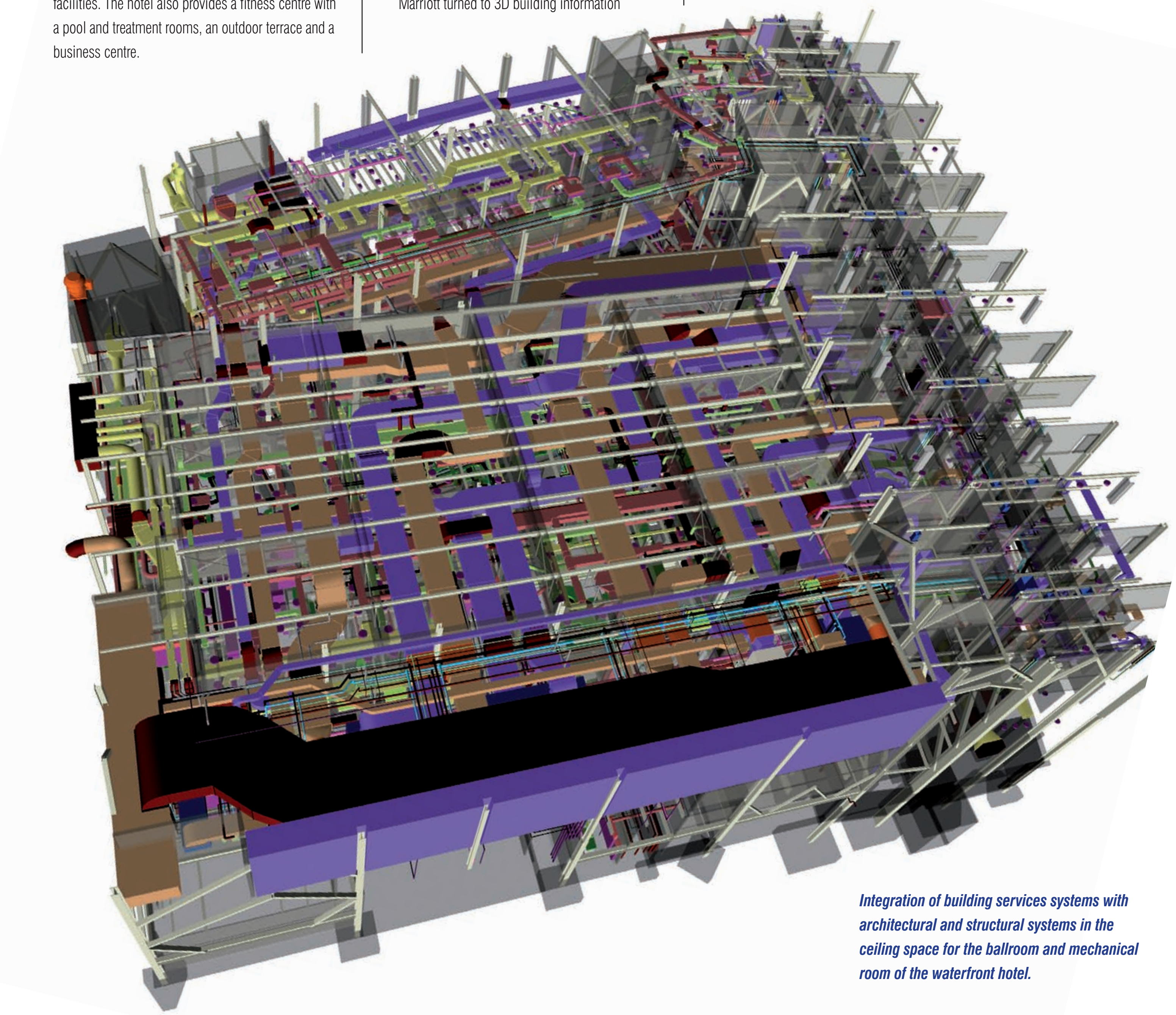
BIM with a view

For the design of its latest waterfront hotel in Boston, Marriot International turned to Building Information Modelling (BIM) to help the steel fabrication, building services and architectural design teams solve potential interferences before and during the construction phase.

One of Marriott International's main goals in the development of its new 22-storey Renaissance Boston Waterfront was to complete the project with as few changes and schedule delays as possible. Featuring 471 guest rooms, including 21 suites, the Boston, Massachusetts, hotel offers more than 20,700 square feet of meeting space, including a 10,700-square-foot ballroom, a junior ballroom, a restaurant and restaurant lounge, room service, and banquet facilities. The hotel also provides a fitness centre with a pool and treatment rooms, an outdoor terrace and a business centre.

Marriott recognised that interferences between design elements during the construction phase are a major cause of cost overruns and scheduling conflicts in large commercial projects. In addition, because floor-to-floor heights were reduced during the design of this particular hotel, Marriott was concerned about the coordination of the mechanical, electrical and plumbing systems in the available ceiling spaces on each floor.

Marriott turned to 3D building information modelling (BIM) soon after the paper-based bidding documents were complete. Realising the limitations inherent in the 2D delivery system and the potential of avoiding costly change orders and associated schedule delays with 3D technology, Marriott tasked GHAFARI Associates, L.L.C. to introduce BIM as a value-added tool for the already assembled design and construction teams. By implementing BIM during design and throughout construction, steel fabrication has been



Integration of building services systems with architectural and structural systems in the ceiling space for the ballroom and mechanical room of the waterfront hotel.

streamlined and interferences between mechanical, electrical, and plumbing (MEP) systems have been minimised.

Tailored workflow

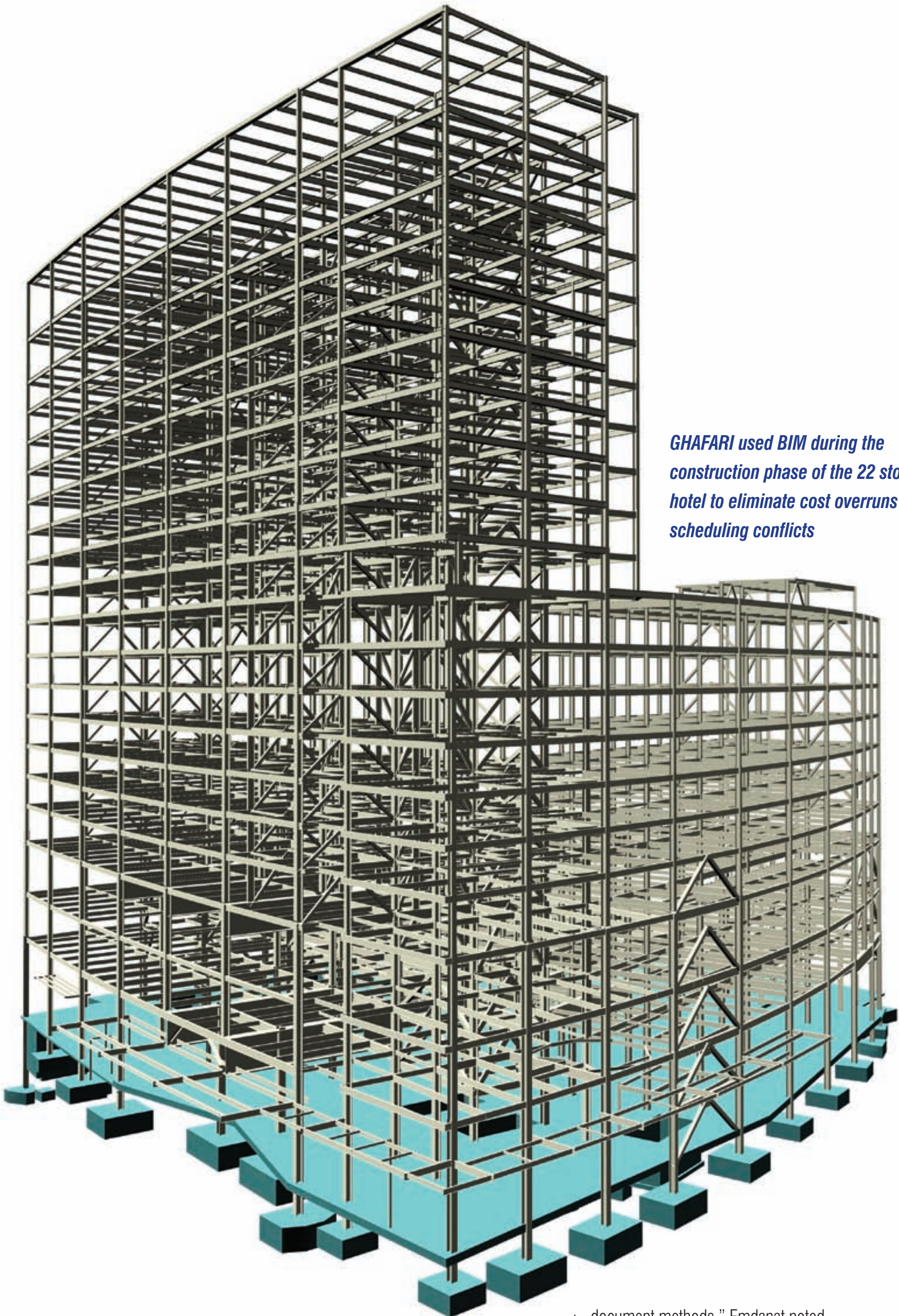
GHAFARI - an organisation of architects, engineers, consultants, and staffing specialists serving the manufacturing, government, and commercial sectors - acted as the 3D BIM integrator for the Renaissance Boston Waterfront project. The firm has considerable experience applying 3D-enabled lean design and construction for automotive facilities and was able to translate those skills to the hospitality industry.

GHAFARI's first task was to model the building entirely and accurately as quickly as possible in order to identify potential coordination problems that might affect early-bid packages such as structural steel. At the same time, the team adjusted its delivery workflow model - which was initially developed as an integrated automotive fast-track design-build delivery system - to Marriott's particular need for a design-bid-build delivery system. A difference in the design-bid-build delivery system is that the 3D BIM effort needed to focus on identifying critical design issues without over-coordinating the facility subsystems to a level that might limit the choices for selected subcontractors.

To meet the project's specific needs, GHAFARI divided its 3D BIM effort into two phases. In the first phase, the facility's 22 storeys were fully modelled using Bentley TriForma-based architectural, structural, and MEP solutions. Automatic interference detection was used to detect design collisions, which were reviewed and grouped into two categories: those requiring design modifications and those that could eventually be resolved during MEP coordination with the subcontractors. The detected interferences were reviewed with the owner and the design teams.

The teams began to review the design documents based on those reports. "As a result, revisions to the structural steel and to ceiling heights were issued before steel was fabricated," said Samir Emdanat, manager of advanced technologies for GHAFARI. "In addition, a redesign for parts of the piping and HVAC systems was necessary on many floors."

During the second phase, GHAFARI worked with the selected subcontractors to advance the original BIM effort to installation-level documentation. Subcontractors were encouraged to work in 3D and to deliver their data for coordination using 3D systems whenever possible. Detailed 3D models from the steel fabricator and the sheet-metal contractors were successfully obtained. In order to complete the coordination process, GHAFARI's BIM team augmented the subcontractors' efforts when 3D data could not be obtained.



GHAFARI used BIM during the construction phase of the 22 storey hotel to eliminate cost overruns and scheduling conflicts

"The structural steel changes were the most notable because the design team could increase the available space for MEP systems to avoid potential conflicts between bracing and architectural components"

Integrating information

Since the intent was to transition this BIM effort into the construction phases, it was important to select systems that supported open industry standards. Choice of Bentley Structural, for example, allowed the team to use industry-standard file formats and integrate the steel fabricator's 3D model files, when they became available, into the overall BIM. "The ability to import the fabricator's steel information and to integrate it into the mainstream coordination models reduces the chances for data re-entry mistakes and saves hundreds of hours of rework that would have been required if the models were to be updated using conventional 2D document methods," Emdanat noted.

In addition, Bentley's support for the DWG format allowed the team to interface with the 3D models supplied by the sheet-metal fabricator as well as other file types provided by the subcontractors and the design. "Early results from the project demonstrate that a number of potential construction changes were detected and resolved early in the process, thus avoiding a more-than-likely increase in the construction schedule and budget," said Emdanat.

The structural steel changes were the most notable because the design team could increase the available space for MEP systems to avoid potential conflicts between bracing and architectural components. In addition, as the effort continues and additional detail is provided to update the 3D BIM during construction, the team is producing highly coordinated 3D-based installation-level documents that will significantly reduce the chances for field changes and associated schedule delays. ***www.bentley.com***

BIM at HOK

Over the past few years HOK has pioneered the use of Building Information Modelling (BIM) in architecture. With Revit Building at the heart of its design process, the firm's London Office has embraced the technology and is already starting to link in Revit Structure for structural design, analysis, co-ordination and documentation.

All industries and professions have their barometers – usually a group of forward-looking firms that are ready to assess and take up new ideas and, consequently, help to signal the way ahead for others. When it comes to design software, HOK is one of these early adopters.

The company's CEO, Patrick MacLeamy is renowned in the industry for his views on using IT to work in a more effective way: "Around the world, I want people to think of us as the smartest firm out there for managing technology and information," he says.

His views are echoed by his CAD director, Mario Guttman, who commented: "It's about the building industry using computers and new ways of working to be more efficient – and create a better build environment…. As a firm, HOK chooses to lead."

With this in mind, it is significant that HOK has become the latest large global company willing to stand up and be counted on Building Information Modelling (BIM) - a building design and documentation methodology characterised by the creation and use of co-ordinated, computable information about a building project in design and construction.

As a result, its London office has bought 150 licences of Autodesk Revit Building and is already working on a full range of projects – around 15 in all – across the practice. It is now well on the road to BIM with plans to integrate the structural design into the Single Building Model when the time comes.

UK CAD manager, Miles Walker, says that the benefits will be huge, and will become increasingly evident as projects progress. "One of the main strengths of BIM is that it ensures projects are in a good position when they reach the construction phase. For example any clashes will have been ironed out long before. Because data has been enhanced throughout the design process, the central model holds all the information needed and this can be shared with engineers, construction teams, the clients and, even when the time comes, facilities managers."

Working smarter

In 2006 the HOK board pledged itself to an idea it called HOK buildingSMART. This self-explanatory concept would be applied to the entire building process from concept design through to facilities management and the ultimate aim would be a single, integrated building model throughout these phases. Or, in other words, BIM.

To help reach this goal it committed to a suite of software products including Autodesk Revit Building. It also set itself the task of piloting Revit Building on over 20 projects worldwide during the first year.

Revit Building is purpose-built for BIM, enabling users to work in a single model environment holding all current design data. Its parametric technology co-ordinates the entire model every time a change is made, so helping to eliminate errors through using outdated data and saving the time taken to change every aspect of a design.

Walker explains that the concept of a single building model was not new to the practice. "We had begun to move towards the idea on a major healthcare project, the Barts and London Hospital, a few years ago. This was designed using Autodesk Architectural Desktop.

"However, Revit Building does require a shift in culture. We wanted to move the emphasis back from the technology to the design, giving architects more control for longer."

"Even senior designers who would not usually have much to do with CAD are finding they like using Revit Building. Rumour has it that they are even playing around with it at the weekend. Technology has to be compelling for that to happen."

HOK UK CAD manager, Miles Walker.

In the UK, HOK has been working with Autodesk reseller partner Excitech which has implemented Revit Building and developed bespoke training programmes. Around 60 staff have been trained on Revit Building and from the beginning, the focus has been senior designers – rather than technicians – first. Now the 20 pilot project landmark has been and gone. The London office has embraced the new technology wholeheartedly and already has around 10 projects running on Revit Building, all at various stages. The variety of these – they range from a 50 storey tower in Istanbul to a new airport terminal in Delhi – certainly shows that the software has been put through its paces.

A major focus has been a large London office building for an international financial institution. The project is now at Stage D and HOK's structural engineers are linking the single Revit Building model with Revit Structure for structural design, analysis, co-ordination and documentation. This will cut out the need to re-create and re-enter data manually during the next stages of the project.

"This is one of the major benefits of BIM. Once a single model has been created, it can be shared with other disciplines further downstream. All the time the model is being updated and populated with further important information.

"There's no need for each stage to re-create their own data or for paper to be sent to and fro."

Integral process

"As CAD has progressed, we're recognising that 2D



Residential development, Bolsover St, London. Ridgeford Properties.

drafting is actually at odds with the way architects think. It had become a parallel process, rather than an integral one," explains Walker.

"On the other hand, Revit Building helps architects realise their ideas faster. They can put down their initial concept and everything builds on that. Because more detail can be added and, therefore, better co-ordination information is available earlier in the design, many issues can be settled sooner, taking the pressure off the working drawing stage," he adds.

Because Revit Building gives architects more freedom to design, the overall consensus is that it is "engaging and enjoyable" to use.

"Even senior designers who would not usually have much to do with CAD are finding they like using it," says Walker. "Rumour has it that they are even playing around with it at the weekend. Technology has to be compelling for that to happen."

However, Walker is realistic enough to recognise that it is not always plain sailing. "Anything that breaks new ground is a challenge and it has required good training and rigorous application.

"You have to push for change and it's not always easy. That is, until everybody starts to see the benefits and then it makes sense."

He reports that he has found guidance from Autodesk, Excitech and user groups. "HOK also has a network of worldwide CAD managers from its 24 offices and we regularly meet to exchange ideas. It's been healthy to bounce ideas off fellow users and as BIM becomes more widely used, the whole process will become more commonplace.

"Designers are now coming out of the first stages of the Heathrow Terminal 5 project (which uses a single model environment) and have seen the benefits of working this way. I think that if you work with people who have already had this experience, the path becomes smoother. They all say they wouldn't go back to the traditional way of working, so as time goes on, the momentum will grow."

Bob Garrett of Excitech agrees: "We've been able to use our experience working with BAA at Terminal 5 to advise HOK and there's a healthy exchange of ideas across the industry showing that the concept of BIM is beginning to take hold. Once people can see the practical benefits, it becomes far clearer to them and they understand what we have been talking about."

Although ADT and AutoCAD are still used in the background at HOK, new projects will use Revit Building wherever possible. "We've used it enough now to be over the honeymoon period and we're still eager. Already we have seen enhanced co-ordination, accuracy and also innovation – all leading to higher quality," says Walker.

"I am still excited about the whole programme. It's been described as 'getting back to doing architecture again' and this is a major pull. However, it is also much more. For example, it is a better way of managing risk as it ensures a far more co-ordinated team, but also well-documented projects.

"It's a real leap forward for us – and for design and construction as a whole. However, we are proving there is a better, smarter way to meet the industry's challenges.

www.autodesk.co.uk
www.excitech.co.uk
www.hok.com

World Vision for HOK

HOK Sport Venue Event, the world renowned architecture firm responsible for high profile projects such as Arsenal's Emirates Stadium, turned to Deltek for a fully integrated enterprise management solution to accommodate geographically diverse projects of all sizes.

HOK Sport Venue Event, the world's leading public assembly design firm with offices on three continents, faced the unique challenge of managing some of the world's largest and most high-profile design projects in multiple time zones. The firm's high-profile UK projects include Wimbledon - The All England Lawn Tennis and Croquet Club, the new Emirates Stadium for Arsenal FC, Ascot Racecourse, and the design for the new Wembley Stadium.

To streamline its operations, HOK Sport Venue Event needed to integrate its core business functions. "We were feeling the effects of not having vital project information linked across service lines and offices," said Bob Gillcrist, former HOK Sport Venue Event principal and now senior vice president at HOK Group. "We couldn't make timely and accurate business decisions because project management wasn't linked to marketing, accounting or resource management."

With offices in London; Brisbane and Kansas City, HOK Sport Venue Event's 350 employees utilised time-consuming and inefficient processes for sharing key client and project-related information. The three offices were not using the same systems, and up-to-date business data – and access to it – was limited. "We basically used spreadsheets to plan and manage our projects and staff," Gillcrist continued. By the time HOK Sport Venue Event's end-of-month reports were completed, they were two weeks into the next month.

Recognising the need for a fully automated enterprise management solution that would help them take their operations to the next level, HOK Sport Venue Event began the search for a fully integrated, single solution that could streamline operations, allow worldwide Web-based access to the most up-to-date financial and project information, and accommodate geographically diverse projects of all sizes. In addition, HOK Sport Venue Event required one system that would enable them to monitor and manage all projects throughout their entire lifecycle, from winning new business to post-project analysis.

Realising the Vision

HOK Sport Venue Event purchased Deltek Vision, Web-based enterprise software that integrates end-to-end business processes for project-oriented firms of all sizes, in 2002, and completed their implementation in less than four months. Today the firm uses Vision to track hundreds of projects, valued at over $6 billion.

"From small consulting service projects of a few thousand dollars to projects over $400 million, Deltek Vision enables us to efficiently manage multiple aspects of our projects," Gillcrist said. "Vision integrates project management, resource planning, client relationship management and project and financial accounting tools so projects can be better tracked and controlled."

Information everywhere

Since choosing Deltek Vision, HOK Sport Venue Event has noted substantial improvements in efficiency across areas of the company. For example, with Web-based Vision, valuable client and project information is available all the time, enabling confident, ongoing decisions for the company whenever necessary.

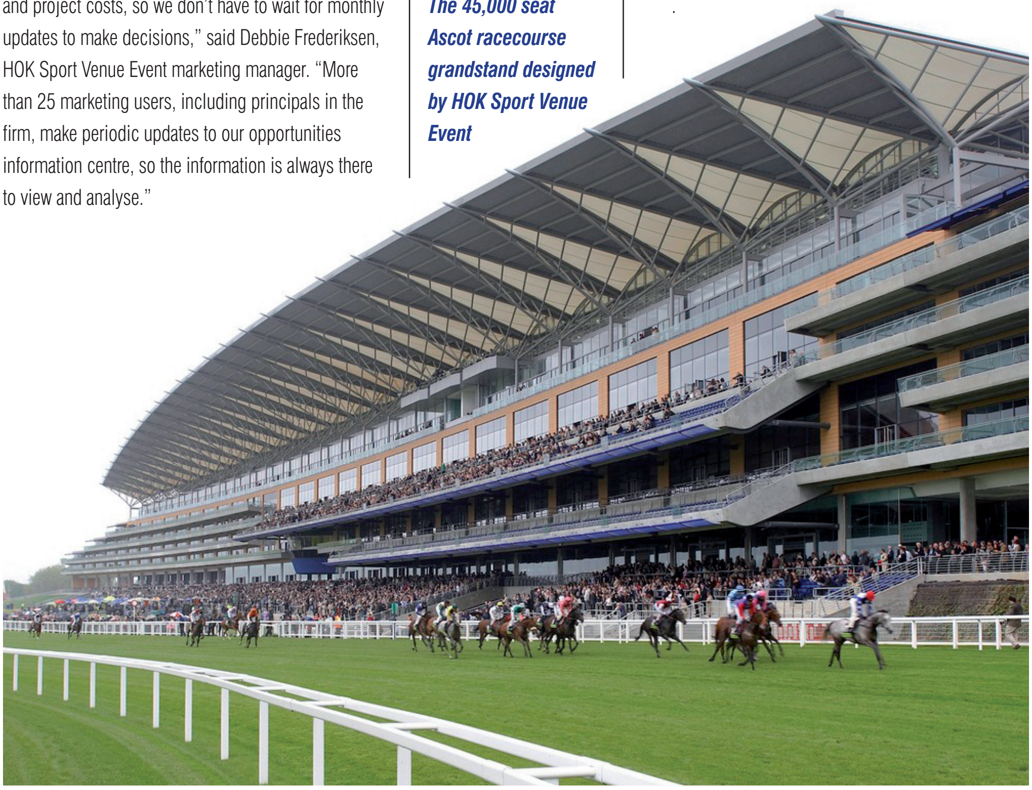
In addition, HOK Sport Venue Event's end-of-month reports can be accomplished by a single person in three days. Before, this process required three people working for two weeks to gather and compile the data for analysis. "Accounting for A/E firms is not standard accounting," said Karen Luttrell, HOK Sport Venue Event accounting manager. "Deltek solutions are very much designed around the way we do business, allowing us to do the things we need to do."

"We now have real-time access to opportunity and project costs, so we don't have to wait for monthly updates to make decisions," said Debbie Frederiksen, HOK Sport Venue Event marketing manager. "More than 25 marketing users, including principals in the firm, make periodic updates to our opportunities information centre, so the information is always there to view and analyse."

"Our reporting capabilities are greatly expanded now that we have the flexibility to generate, and share our own reports or use one of Vision's report templates. We are able to analyse the data in many ways as needs arise," continued Luttrell. "We no longer have to request and wait for reports from the corporate office, which greatly reduces the time needed to process our business information and make decisions."

HOK Sport Venue Event executives credit their high end-user acceptance to Deltek Vision's intuitive interface. The entire implementation took less than four months and over 250 employees were trained on the Time Collection module in just two days. "We cycled employees through training sessions on Wednesday and Thursday, and by Friday, we had closed out the timesheet period," said Gillcrist. "Very impressive."

For HOK, a Deltek accounting software client for more than 10 years, selecting Deltek Vision as their full enterprise management solution was clear: "Deltek Vision allows us to manage our business at peak performance levels because it was clearly designed around the way we do business," said Gillcrist. "We've been using Deltek products because Deltek works with us, listens to our needs and then designs solutions to address our challenges." ***www.deltek.co.uk***



The 45,000 seat Ascot racecourse grandstand designed by HOK Sport Venue Event

Epson Stylus Pro (wide format)

It's not often you see a printer manufacturer being transparent about the cost of its consumables, but for its latest range of wide format machines, Epson is being upfront about ink and paper costs with a view to dispelling the myth that inkjets are expensive to run. By Greg Corke.

In printing circles Epson is probably best known for its home and professional imaging products - areas where it enjoys great success. However, in the CAD sector, things are different, and pitted against the seemingly untouchable HP, Epson, like so many other large format inkjet print manufacturers, doesn't often get a look in.

With the brand, the technology, competitive prices and an extremely loyal customer base, HP is an extremely hard nut to crack. But while companies such as Océ have challenged HP by delivering machines capable of production level colour printing, Epson is playing to its own strengths, those of print quality and low maintenance costs.

Aiming for the top slice of the CAD/GIS market, Epson is targeting users who require high quality prints of renderings, photographs or colour maps, rather than lines, arcs and circles. And at the same time the company is being up front about exactly how much its machines cost to run.

The product range

Epson's CAD/GIS large format product range is made up of three products: the Stylus Pro 4400 (A2+), the Stylus Pro 7400 (A1), and Stylus Pro 9400 (B0+). All three printers use the company's Piezo print head technology, coupled with its pigment-based Ultrachrome ink.

Unlike most inkjet systems, which use thermal technology to deposit ink, Epson's Piezo print head technology uses a change in voltage to apply its droplets. According to Epson, Piezo has greater print accuracy than thermal inkjet technology, but perhaps more importantly from a cost perspective, the print heads do not need to be replaced over the lifetime of the printer. Continual heating puts a strain on thermal print heads, which means they need to be changed periodically.

All three Stylus Pro models are CMYK, featuring Cyan, Magenta, Yellow and Black inks. Cartridges are available in sizes of 220ml or 110ml, and while four cartridges are standard on the Stylus Pro 4400 (A2+), both the Stylus Pro 7400 (A1) and Stylus Pro 9400 (B0+) are able to carry two cartridges of each colour to maximise unattended operation. Cartridges can also be changed when printing.

Single roll feed paper delivery is standard across the entire range, though the Stylus Pro 4400 (A2+) also features a paper tray at the front for individual sheets. In addition, all units feature a straight path feed from the rear so media up to 1.5mm in thickness can be accommodated without any problem. This is great for those who need to print directly onto presentation boards.



The Epson Stylus Pro 9400 (B0+).

All machines feature standard UBS 2.0 and Firewire interfaces, though the printers also plug directly into Ethernet networks. In a network environment, prints are processed on individual PCs using the supplied Windows or AutoCAD Heidi drivers and a dedicated print server stores and manages all the print data.

Speed and quality

The Epson Stylus Pro 4400, 7400, and 9400 are not workhorse large format printers, like HP's DesignJet 1000 Series, but that doesn't mean they are slow either. At 720dpi, the Stylus Pro 7400 can output a full colour A1 print on matte paper in just six minutes with line work coming in under four. In draft mode this is reduced even further.

In terms of quality, results are impressive, particularly when printing full colour on premium glossy photo paper. However, the quality on matte paper is also remarkable, particularly when you consider a standard ISO 400 A1 print will only cost you a shade over £1.50. The colours aren't as bright and the definition not as crisp as on more expensive media types, but for presentations and posters the quality is more than adequate.

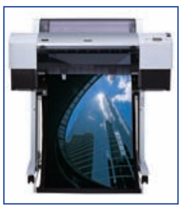
The bottom line

The running costs of inkjet printers are often hidden. Indeed, in the consumer sector it's got to a stage where it's almost cheaper to buy a brand new printer than to replace the ink cartridges.

While this potential land fill nightmare doesn't translate to the wide format sector, ongoing costs - particularly from paper and inks - can still be high. In an attempt to make these costs much more transparent, Epson has developed an online tool to help users to better estimate exactly how much different types of prints will cost.

Users simply select their printer model number, cartridge size, media size and type, and print resolution, and the system will calculate a print cost per page based on an industry standard ISO 400 image. It's actually quite surprising how cost effective some prints are, and it makes it much easier to make informed decisions as to which media offers the best price/performance. N.B. At the time of writing this facility was only available on CD ROM, but it will go online in February.

All other costs - such as those relating to a one time service required during the lifetime of the printer - are not included here, but these are minimal. However, in relation to other ongoing costs, Epson is keen to stress that it never needs to replace its print heads, which can be expensive in the long term for thermal ink jet printers.



The Epson Stylus Pro 7400 (A1).



The Epson Stylus Pro 4400 (A2+).

Conclusion

Manufacturers have always said that to get the best out of any inkjet printer the best quality ink and media need to be used. While this is still true, print quality on lower cost media has improved dramatically over the years and with Epson's latest Stylus Pro printers, users can even achieve excellent full colour results on standard matte paper.

In addition, Epson should be applauded for making its ongoing print costs more transparent, but with a list price more expensive than some of its competitors, it's probably a necessary marketing tool in this ultra competitive marketplace. While other vendors may offer a lower entry price point, ongoing running costs from extras such as print heads, can soon mount up.

Most people wouldn't buy a car without knowing how many miles per gallon it does, so why should it be any different for a printer that costs thousands of pounds?

Epson Stylus Pro 4400 (A2+)	£1,395
Epson Stylus Pro 7400 (A1)	£2,195
Epson Stylus Pro 9400 (B0+)	£4,095

Web: *www.epson.co.uk*
www.colourgen.com

Workstation reviews

Quad Core is shipping and brand new workstations from CAD 2 and HP offer much for high-end users. However, Dual Core still has a huge role to play in the CAD sector and Scan puts forward an excellent value propostion for mid range CAD users, says Greg Corke.

I recently heard a great analogy for Quad Core CPU technology from a Canadian analyst at HP and Intel's Quad Fest event in Colorado. He likened CPU cores to disposable razors, which have added more and more blades over the years. Do two, three or four blades shave you any closer than one? Probably not, but the guys that make the razors would certainly have you believe it - David Beckham's chin certainly looked smooth on the telly!

Now I'm not saying Quad Core is all about good marketing without substance - far from it. The technology clearly provides a perfect platform to help transform the way architects and engineers work with CAD, rendering and analysis software. However, Quad Core certainly means different things to different people.

Two CPU cores in a single workstation will be more than sufficient for many users, particularly if all they do is design. Four cores are great if you run CAD with structural analysis number crunching in the background, and eight cores are already becoming a necessity if you're a design visualisation user looking to slash your rendering times. It's all about finding the right tool for the job, which is why this month we bring you three brand new workstations which range from two to a whopping eight cores, and vary in price from a staggering £6,000 right down to just under a grand!

CAD2 Imagine QX64

The Intel core2 extreme QX6700 processor at the heart of CAD2's latest workstation isn't actually a native Quad Core processor; it's two 2.66GHz Core 2 Duo E7000 chips bolted together, each of which shares 4MB of Level 2 cache, giving 8MB in total. The end result is a chip that boasts excellent performance in multithreaded applications and impressive capacity for multi tasking, but,when all four cores are being hammered, outputs a fair amount of heat. As a result, those who have been spoilt by the near silent operation of most recent Intel Dual Core-based workstations may be a little disappointed when the CAD Imagine QX64's cooling fans kick into overdrive. It's not loud by any stretch of the imagination, but noticeable all the same.

This is a small price to pay for cutting edge performance which the Imagine QX64 has in abundance, making incredibly light work of scan line rendering in 3ds Max 9 and hardly raising an eyebrow when running concurrent calculations in multiple applications. A total of 4GB of RAM makes this level of multi tasking possible, but for those working with much larger datasets, the machine can be equipped with a maximum of 8GB (4 x 2GB DIMMS) and of course Windows XP x64 Edition to unleash this additional capacity. (N.B. Both 32-bit and 64-bit versions of Windows XP Professional come with a free Microsoft Windows Vista upgrade pack)

The graphics card is the mid-range PNY Quadro FX 1500, which delivers excellent performance under most CAD applications. Those that are used to working with OpenGL in 3ds Max may be disappointed to learn that Nvidia's dedicated Quadro Maxtreme 9 driver has now been optimised for Direct3D instead of OpenGL. As a result, OpenGL performance has taken a hit, which is sure to affect those who prefer to work in wireframe, an area where previous generation OpenGL Maxtreme drivers were strong. On the flip side, this is likely to add stability to DirectX, which is certainly the future of 3ds Max, though performance does not seem to have improved much over standard DirectX drivers.

The Imagine QX64 is laden with storage options, which include an 8-in-1 Digital Memory Card Reader and 18x Dual Layer Dual Format +/- DVD-ReWriter. This is in addition to its two 150GB Western Digital Raptors, which are configured in a Level 0 Raid Array as a single high performance OS/application drive, and a massive 320GB Seagate Barracuda 7200.10 S-ATA300 drive which is optimised for data storage.

The Black/Silver ATX Workstation chassis is solid and once the lid is off you can see the components are neatly wired throughout. There's still room for expansion in terms of additional hard drives and supplementary cards, however, with only a single CPU socket and capacity for four DIMMs, the ASUS P5WDG2 motherboard is already full to capacity - so if you're looking for a machine to grow into there are limited options here. In saying this though, a careful choice of memory at the outset and the fact that you've already got four extremely powerful processor cores at your disposal should ensure this workstation will serve your compute intensive requirements now and well into the future. This is with particular reference to growing datasets and 64-bit operating systems.

The Imagine QX64 is certainly an attractive proposition for those who carry out multiple computational tasks at once, or work with multithreaded rendering applications such as 3ds Max. Whether your average CAD user will ever make use of all four cores is another question entirely and here a 2.66GHz Dual Core E6700, which drops into the same Intel LGA 775 slot, would be the better and more cost effective choice.

www.cad2.com

Specifications

CAD2 Imagine QX64

- Intel Core2 Extreme QX6700 (2.66GHz) (quad core)
- 4 x 1GB PC2-6400 800MHz memory
- ASUS P5WDG2 motherboard (Intel 975X chipset)
- PNY Quadro FX 1500 graphics card (256MB)
- 2 x 150GB Western Digital Raptor drives (OS + Apps)
- 1 x 320GB Seagate Barracuda 7200.10 S-ATA300 (data)
- 8-in-1 Digital Memory Card Reader?
- 18x Dual Layer Dual Format +/- DVD-ReWriter
- Microsoft Windows XP (32-bit or 64-bit) (with free Microsoft Vista Upgrade)
- £2,145



HP xw8400

For a machine kitted out with two Quad Core processors, you'd expect something pretty special when it comes to performance. However, with Intel's roll out of Quad Core Xeons staggered in two phases, those that board the bus too soon are likely to be rather underwhelmed. At the time of writing, the fastest processor HP can deliver inside its high end xw8400 is the Xeon E520, which runs at a modest 1.86GHz. However, the faster E5335 (2.0GHz), E5345 (2.33GHz) and X5355 (2.66GHz) chips should be available by the time you read this.

While having eight cores in a workstation promises huge capacity for parallel processing, the problem that all CAD users have is that too many processes, including graphics, currently rely on the performance of a single core. And when this goes down to a relatively low 1.86MHz you start to notice the current shortfalls in Intel's Xeon Quad Core technology.

Out of all the machines on test this month - including Scan's sub £1,000 3XS workstation – HP's xw8400 was the slowest machine when it came to 3D graphics, despite sporting a top of the range Nvidia FX5500 graphics card. It also brought up the rear in most of our CPU intensive CAD application tests. Indeed, you only really start to see the true potential of eight cores when rendering in 3ds Max 9, but despite setting a record in this multithreaded application, there wasn't a huge performance gain over CAD2's Intel Core2 Extreme QX6700, 2.66GHz-based machine, which has four cores.

However, to disregard the xw8400 on its current processor performance would be a huge mistake. This high-end workstation benefits from HP's increasingly impressive industrial design, both in terms of build quality and accessibility. From hard drives to memory, all components are easy to get to, and with only 2 x 2GB DIMMs filling eight of its memory slots, the machine can be easily upgraded to a substantial 16GB, which will be invaluable for many high-end design visualization users. In addition, despite featuring a combined thermal design power (TDP) of 160W, the machine still ran relatively quietly with all eight cores in full flow. It will certainly be interesting to see how the xw8400's optimised cooling system reacts when loaded with two 120W TDP Xeon X5355 (2.66GHz) chips.

And it's with this processor and Intel's E5345 (2.33GHz) that the xw8400 will start to come into its own, providing plenty of power to drive the high-end CAD applications of today and tomorrow, whilst also unleashing the true power of Nvidia's ultra high-end Quadro FX5500 in graphics intensive operations. We would expect that by the time you read this the xw8400 will be starting to benefit from Intel's second quad core phase, but expect to pay a huge premium for the pleasure. Cutting edge technology such as this doesn't come cheap. ***www.hp.co.uk***

Specifications

HP xw8400

- 2 x Intel Xeon E520 (1.86GHz) (quad core)
- 2 x 2GB DDR-2 PC2-5300 667MHz memory
- HP motherboard (Intel 5000X chipset)
- Nvidia Quadro FX 5500 graphics card (1GB)
- 250GB Seagate Barracuda 7200.9 hard drive
- DVD+/-RW Double Layer LightScribe
- Microsoft Windows XP (32-bit or 64-bit)
- £6,021



Scan 3XS

It was only in mid summer 2006 that Intel introduced its new generation dual core chip, the Core2 Duo, and by the New Year there are already some serious bargains to be had as Quad Core comes into view. Intel's Dual Core 2.4GHz Core 2 Duo E6600 is now available for well under £200 and if you're not heavily into analysis or design visualisation, it's one of the best price/performance chips currently out there. This fact has not been lost on Bolton-based workstation manufacturer, Scan, who has put the E6600 at the heart of its new 3XS workstation to deliver a machine that not only boasts an extremely attractive price point, but is not exactly shy when it comes to performance.

Scan has partnered Intel's Dual Core chip with 2GB of DDR-2 memory, which is a minimum for most serious CAD users, but still provides capacity to work with some fairly large models. However, with two DIMMS free on the ASUS P5B-E iP965 S775 motherboard, this can always be expanded in the future. Four SATA slots also give plenty of options for additional hard drives and RAID configurations for increased performance and redundancy, though in terms of capacity the 250GB Samsung SpinPoint drive already does a good job.

The ATI FireGL V3400 graphics card, while being an entry-level card on paper, still gives a good account of itself under most 3D CAD applications we tested it with.



However, 3ds Max users will probably need to make the upgrade to a FireGL V7300 or V7350, not only for enhanced geometry performance, but also to benefit from the additional memory. The 128MB of memory built into the FireGL V3400, doesn't go very far these days.

Just 12 months ago a dual processor workstation was considered a bit of a luxury, but now it's the de facto standard, even in an entry level machine like this. At the moment you pay a premium for Quad Core and you have to ask yourself if you really will make use of this new generation technology. If you're a typical CAD user, I would suggest the answer is no and machines like Scan's 3XS workstation offer an excellent proposition for architects and engineers, and more importantly for those that pay the bills, as it does this for under £1,000. ***www.scan.co.uk***

Specifications

Scan 3XS

- Intel Core 2 Duo E6600 (2.4 GHz) (dual core)
- 2 x 1GB Corsair DDR-2 PC2-6400 800MHz memory
- ASUS P5B-E iP965 S775 motherboard
- ATI FireGL V3400 graphics card (128MB)
- 250GB Samsung SpinPoint P120 hard drive
- NEC 18x DVD±RW Dual Layer
- Microsoft Windows XP (32-bit or 64-bit) (with free Microsoft Vista upgrade)
- £960

Space Navigation

With 3D software now becoming more prevalent, it's not surprising to see a number of 3D controllers on the market. We have to face the fact that the trusty two button mouse just doesn't cut it for 3D modelling anymore, says Martyn Day.

Despite the deficiencies of the 'mouse' as a means of modelling in 3D, getting widespread use of 3D controllers with CAD products has been a notoriously difficult nut for manufacturers to crack. If you have never had access to a 3D input device then you don't know what you are missing and you learn to adapt your modelling style to the input device that you trained on - normally a two button mouse.

CAD vendors have typically assumed that users will be using a mouse to drive their software and have spent considerable efforts to make the interface and manipulation tools geared to mouse and keyboard commands. The last thing they want to do is to require an additional purchase of an expensive input device for widespread use. And to be honest up until the end of last year, 3D controllers could be thought of as expensive but I would have argued that the productivity improvement of modelling with one would easily pay back that return on investment.

However, it's with great excitement that I can now say that there's an excellent 3D controller on the market that costs no more than a decent mouse and it has all the heritage of the professional-level products. 3D controllers are now at a volume price point.

3D Connexion, a Logitech company, has been at the forefront of 3D controller design for a number of years. Its SpaceBall and SpacePilot products have been amongst the most successful of the high-end 3D controllers. However, with the rise of 3D CAD, the company has been steadily driving down the price point of its devices over the years. This month sees the launch of the first sub forty pound 3D controller, the SpaceNavigator.

SpaceNavigator

The SpaceNavigator is a bit like a round mouse but it doesn't move about the desk. Instead the cap of the device is all that moves, implying the direction or manipulation is all that's required. It's all In the wrist. It's a heavy unit, probably 70% metal. I am unsure which type of metal it's made from but from its weight I would suggest depleted Uranium! Honestly, if you were to drop this out of the Window, it's likely to kill someone. So, it's damn well made.

The SpaceNavigator is held in one hand while the traditional mouse is held in the other - the operator now controls the modeling environment with two input devices. This completely eliminates combination keyboard and mouse clicks required to position models or objects on the screen in 3D software applications. By applying pressure to the SpaceNavigator's cap, users can pan, zoom and rotate in one fluid motion with one hand while simultaneously selecting, creating or editing with a mouse in the other. After a while, navigation becomes second nature, freeing the designer to model.





The SpaceNavigator might fit easily between the fingers, but weighs in at a hefty 479g, enough to kill at distance.

There are two programmable buttons on the device. By default one button simply 'fits' a model in the centre of the screen, for when you get lost and the other brings up the SpaceNavigator's control panel.

It's easy to install, comes with a CD, and works with a wide range of professional and non-professional applications. While it's great in 3D CAD, the SpaceNavigator really brings Google Earth to life. You can fly about the planet and down valleys and mountains! I'm sure even kids will start using this device.

Of course, it's not like any of this is new - the 3D Connexion products have offered this functionality for a number of years. The big benefit, despite the huge amount of metal in it, is that the SpaceNavigator costs £39. As they say, that's a no-brainer. The only odd bit is that at this price, the SpaceNavigator comes with a 'non-commercial' license. The product isn't limited in anyway and comes with all the drivers, however, if you want to use the device with a 3D package in a commercial environment, 3D Connexion would like you to pay them a bit more by upgrading your license (making the total cost £69), without getting any benefit in return. I don't see how they can police this, in some ways it's like an 'honesty bar'. If you are going to use the device to make money, then to stay 'legal' you should upgrade the license.

Conclusion

I can't emphasize enough how this really is an important indicator that 3D is becoming widely used. 3D is now in the volume market. More people are using and designing in 3D, with products like SketchUp, to the point where controllers like SpaceNavigator can be offered at reasonable price points. It's really well made for the money and could well be added to every CAD workstation that gets shipped out by dealers. Also, after a few years, when it's time to upgrade to SpaceNavigator 2, you could easily redeploy your old SpaceNavigator as a doorstop!

Next month we will have a look at 3D Connexion's new mid-range product, the highly ergonomic SpaceExplorer.

www.3dconnexion.com